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Building Resilience to Climate Change Requires Investment in Nature

By Shiva Polefka and Gwynne Taraska April 8, 2016

Last December, the world's diplomats achieved consensus on the Paris climate agreement and delivered a thrill of hope that limiting global warming to within 2 degrees Celsius over preindustrial levels—the internationally agreed threshold for avoiding the worst effects of anthropogenic climate change—might still be possible.[1] However, the agreement acknowledges that international collaboration and finance is essential to help developing and climate-vulnerable countries adapt to the profound changes in the planet's physical system that have already been unleashed by greenhouse gas pollution from deforestation, fossil fuel burning, and other human activities over the past 100 years.

While a substantial gap persists between global need and the scale of mobilized resilience finance, there is no doubt that donor countries are increasingly recognizing the importance of investing in adaptation to climate change.[2] Perhaps the most prominent new mechanism for public resilience and adaptation funding is the Green Climate Fund, or GCF, which is supported by a diverse group of 42 countries and counting that have collectively pledged more than $10 billion toward the fund's capitalization.[3] Although multilateral climate funding to date has predominantly invested in emissions mitigation measures, the GCF is dedicated to supporting mitigation and adaptation evenly over time.[4] Similarly, the Paris agreement itself advises countries to strive for a balance between mitigation and adaptation funding.[5] The United States, for its part, announced during the Paris summit that it will double its grant-based adaptation finance by 2020.[6]

It is increasingly important that as investments in resilience finance grow, major stakeholders—including climate-vulnerable countries, donor countries, and international financial institutions—collaboratively articulate and prioritize vulnerable- and low-income countries' climate adaptation needs. To date, public finance for adaptation has largely been allocated toward constructed infrastructure, such as coastal armoring, agriculture, and systems for water delivery, wastewater management, and energy supply.[7] These investment sectors reflect important vulnerabilities for human survival and well-being in the context of the major impacts anticipated from climate change, such as sea-level rise and extreme fluctuations in precipitation. For example,

the Intergovernmental Panel on Climate Change's 2014 forecast of climate change impacts in Asia identified water scarcity as a "major challenge," predicted declines in agricultural productivity for major crops, and found it "likely that mean sea level rise will contribute to upward trends in extreme coastal high water levels."[8]

However, human-built infrastructure and systems are not the only sectors that require significant investment to prepare for the inevitable changes in Earth's climate and oceans. Within the resilience and adaptation community, investment in the protection and restoration of nature is perhaps the most important sector that remains underemphasized and inadequately studied. Globally, ecosystems have been estimated to provide economic benefits on the order of $124.8 trillion in 2007 dollars per year to human society. This estimate includes both extractable natural resources—such as fish and timber—and ongoing services that sustain human life—such as water filtration, photosynthesis for oxygen production, and pollination and soil productivity for food production. Coastal forests, wetlands, coral reefs, and other ecosystems also provide flood and storm protection for human communities.[9] In short, ecosystem services are of fundamental importance to human society and global economic vitality. As climate adaptation and resilience policies are drawn up and implemented in the Paris era, it is essential that donors, climate fund managers, and funding recipients prioritize investments in the resilience of global ecosystems—not just infrastructure.

Ecosystems and biodiversity: A crucial sector neglected

Global warming undermines ecosystem health and reduces the flow of economically valuable benefits. As patterns of weather and precipitation change with planetary warming, many species and even whole ecosystems are no longer well-adapted for their physical location. Although some species are able to adapt by migrating to higher ground and cooler latitudes or waters, others are often blocked from essential movement by natural borders or human development or are unable to compete with new, in-migrating species. [10] In combination with other stressors such as pollution, deforestation, or overfishing, climate change can overwhelm the capacity of ecosystems to withstand and recover from major perturbations such as fires, flood, or disease.[11] According to one leading researcher, ecosystems are among the global sectors that are most sensitive to climate change, and current emissions commitments, even if fulfilled, still portend putting 20 percent to 30 percent of species at a high risk of extinction and causing widespread coral bleaching, wildfires, and species migrations.[12]

As biodiversity and the production of ecosystem services decline, the costs from asset losses, declines in human well-being, and expenditures on artificial replacements rise, exerting a drag on economies large and small.[13] Rural and poor communities—which often supplement low incomes through subsistence hunting, fishing, gathering, and other nature-dependent activities—lose this economic safety net when nature is degraded.[14]

Meanwhile, urban and higher-income communities also depend on ecosystem services for consistent fresh water delivery,[15] treatment of waste, and the productivity of the forests, farms, and fishing grounds that feed and house their residents.[16]

Awareness of these linkages between climate change, ecosystem health, human well-being, and economic vitality continues to grow. In 2014, researchers estimated that, as a result of all causes of environmental degradation, the total value of annual ecosystem services delivery declined $20.2 trillion in 2007 dollars between 1997 and 2011.[17]

Despite growing scientific evidence for the overall scale of economic dependence on biodiversity and healthy ecosystems, donors and policymakers involved in international climate finance still face large gaps in knowledge about how much global warming's specific toll on ecosystems will cost and how much needs to be invested. In its comprehensive assessment on the state of global adaptation finance relative to projected needs, the U.N. Environment Programme, or UNEP, highlighted that ecosystem services represent the least well-characterized sector for understanding the appropriate scale of adaptation investment. Despite ecosystems' immense economic value, the report observed that "estimates of the potential impact of climate change and the cost of adaptation are almost completely missing for biodiversity and ecosystem services; they are therefore not included in the [current] global estimates [for adaptation funding needs]."[18]

While such an egregious lack of data would be a concern for any major global sector vulnerable to climate change, the lack of data on the investments needed to maintain ecosystem services is acutely problematic. "This is a major omission as these are among the most vulnerable of all sectors because of ecological limits and low adaptive capacity," the UNEP explained. "The limited studies that do exist indicate sector costs could be much larger than estimates for quantified sectors."[19]

Recommendations for action

This deficiency in both research and strategy for sustaining economically important ecosystems presents the international climate finance community with three important opportunities for action.

1. Increase research on ecosystem services decline due to climate change

Major institutions for climate policy and climate finance, as well as major donor countries—such as the United States, Japan, and EU member states—should dramatically increase their demand for scientific and economic research on the expected impacts on biodiversity and ecosystems from climate change and development of measures to address them. The United Nations' acknowledgement that unknown ecosystem impacts

and related adaptation costs could dramatically raise the estimated global costs[20] means that the newly forming constellation of multilateral climate funds targeting resilience could be structurally deficient. Without scientific understanding of the full range of climate adaptation challenges and opportunities, these funds' resilience and adaptation investment portfolios will not accurately reflect or address people's needs.

2. Coordinate international donors and funds to better address the preservation of ecosystem services

Leaders of major climate finance institutions and donor countries should initiate bilateral and multilateral coordination around ecosystem protection and restoration for the purpose of climate adaptation. The Green Climate Fund is emerging as a focal point for adaptation and resilience finance given that the fund is newly operational and aims to elevate adaptation funding to match its support for mitigation. Moreover, ecosystem-based projects are among the fund's first tranche of approved investments—such as a project that addresses the damage to ecosystems and communities caused by land salinization in Senegal—and among the proposed projects that are likely to be presented to the board for consideration in 2016.[21] However, the Global Environment Facility, or GEF—which was founded by the international community at the 1992 Rio Earth Summit—has decades of experience making major grants for the protection of nature, including international waters and biological diversity, and the prevention and reversal of land degradation.[22] Accordingly, the GEF could be a natural partner and adviser in resilience and adaptation finance for the preservation of ecosystem services. During the GCF meeting in March, the board requested that the secretariat prepare a proposal for its June meeting on how the fund could complement existing finance efforts.[23] Leaders in international climate finance should not let this topic fall by the wayside and should convene as soon as possible to maximize complementarity in their programming and portfolios and ensure that all major areas of climate vulnerability are properly addressed by flows of international adaptation finance.

3. Increase collaboration with organizations and initiatives working to protect and restore nature

Finally, the international climate finance community should actively support and collaborate with governments, nongovernmental organizations, and other parties in the following three arenas where international investments already target preservation and restoration of ecosystems and biodiversity.

Habitat and watershed conservation

Given their expertise in ecological science and natural resource management policy, nongovernmental organizations, or NGOs, and multilateral initiatives focused on conservation of watersheds and wildlife habitat will be important partners in channeling international resilience finance toward the preservation of relevant ecosystem services.

In some cases, researchers and conservationists are beginning to integrate resilience and adaptation considerations into their strategies. For example, an international team of eminent NGO and academic researchers published a global geographic analysis in 2013 that identified 10 high-priority areas worldwide where investments in habitat conservation would support preservation of agricultural productivity and other vital ecosystem services in the context of climate change. These findings underpinned the team's proposal that scarce adaptation funding be applied to fulfilling "integrated" environmental and developmental goals.[24]

Furthermore, scientific evidence continues to grow that ecosystems that are protected from local human stressors—such as pollution, overfishing, and the degradation and fragmentation of habitats—exhibit greater intrinsic resilience to increases in temperature and seawater acidity.[25] This corresponds with ecological theory that greater diversity within and across species increases the chances of an ecosystem being able to rebound from a major perturbation or adapt to a changing baseline of environmental conditions.[26] Accordingly, international aid for the development of institutional capacity in climate-vulnerable countries to manage natural resources, enforce environmental law, and preserve ecological assets could be fruitful as investments in sustaining the flow of ecosystem services in the face of climate change.

Frameworks to pay for ecosystem services

REDD+, the international framework for reducing greenhouse gas emissions from deforestation and forest degradation plus sustainable forest management, represents one of the most advanced systems for monetization and trade of an important ecosystem service. Specifically, REDD+ creates a market for the carbon capture and storage services that healthy, standing forest ecosystems provide in order to tilt the economics of land use in developing countries toward forest preservation.[27] In the development of the REDD+ system, additional facets of forest resource management—including biodiversity conservation[28] and the rights and land tenure of indigenous peoples[29]—have been incorporated with the support of REDD+ implementation bodies such as the United Nations' UN-REDD Programme and the Forest Carbon Partnership Facility. In forested countries with significant climate vulnerability, REDD+ institutions could identify forest areas that provide resilience benefits to adjoining communities and prioritize anti-deforestation investments for those forests. Including resilience benefits as a consideration for REDD+ investments would help maximize the returns to society, ensuring the capture of both the mitigation and adaptation benefits of forests.

In recognition of this year's U.N. International Day of Forests on March 21, U.N. Secretary-General Ban Ki-moon referenced a concrete example of the economic upside and resilience benefits of strategically targeted investments in the prevention of deforestation. "City dwellers in Bogota, Durban, Jakarta, Madrid, New York, Rio de Janeiro and many other major cities rely on forested areas for a significant portion of their drinking water," Secretary-General Ban said. "When we protect and restore forested watersheds, we can save on the cost of building new infrastructure for water purification."[30]

Infrastructure development that integrates nature and nature-based features

A large proportion of international resilience finance already flows to built infrastructure for water, transportation, coastal protection, and flood control.[31] Interdisciplinary research in recent years by engineers and ecologists has revealed that many of these kinds of projects—which are designed to reduce the risk from climate-related hazards such as flooding, erosion, storm surge, and sea-level rise—can incorporate ecosystem restoration and the integration of nature-based features in ways that both reduce overall project costs and generate diverse co-benefits via ecosystem services.

In the aftermath of Hurricane Katrina, for example, a blue ribbon panel of hydrological engineers determined that despite being overtopped by floodwaters, levees in St. Bernard Parish in southern Louisiana survived the deluge in part due to the buffering effect of adjoining wetlands. In contrast, the panel found that similar levees devoid of wetlands near the Mississippi River Gulf Outlet failed even before they were overtopped. As result, the panel identified healthy wetlands as important and complementary "lines of defense" in the design of effective flood control infrastructure systems.[32] In other words, these ecologically valuable habitats also prevented economic losses from extreme weather. Similarly, an independent study of the San Francisco Bay Area's climate adaptation needs by The Bay Institute determined that to accommodate predicted sea-level rise, new levees fronted by a continuous buffer of restored tidal marshes would need to be half as tall as traditional infrastructure alone, providing significant ecological benefits and saving more than $1 billion in construction costs over all 275 miles of the San Francisco Bay perimeter.[33]

International finance for infrastructure designed for resilience and adaptation could deliver higher social returns for less overall cost through incorporation of ecosystem restoration. Such returns on investment are not only ideal for the donor countries and financial institutions that fund resilience projects, but also for the climate-vulnerable recipient countries and the local communities that are better sustained by the function of the ecosystems on which they rely.

Conclusion

The international community has begun to organize and respond to the urgent need for investments in resilience and adaptation to climate change. However, until ecosystems, a major pillar of global economic vitality, become a core component of climate change adaptation strategy and a primary target for corresponding investments, the response will remain structurally flawed and insufficient. Fortunately, an array of opportunities exist for donors and funds to protect and restore ecosystems in ways that yield a multitude of benefits for both the sustained vitality of nature and the well-being, prosperity, and fairness of the world's deeply interconnected human society.

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Endnotes

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