

## **Thriving livelihoods and sustainable ecosystems in lower income countries**

### **1-year objectives**

1. Identify economic activities in Bangladesh that generate substantial harm to the environment and to community health.
2. Work with in-country colleagues and Stanford faculty and students to develop alternative approaches that support employment, generate income and are scalable and sustainable.
3. Identify the most promising opportunities for collaboration.

### **5-year objectives**

4. Prototype, pilot and iterate approaches to move targeted economic activities towards sustainability.
5. Expand activities to a second project country in sub-Saharan Africa.
6. Advance successful pilots to functioning enterprises that can operate without subsidies and outcompete less sustainable businesses.
7. Build the knowledge base about sustainable economies and ecosystems in low- and middle-income countries.
8. Convene communities of knowledge and practice to catalyze similar efforts globally.

### **Rationale**

84% of the human population lives outside of high-income countries. Lower income countries carry a dual burden of progressively degrading environments and vulnerable human populations. Developing sustainable practices in these settings is crucial to achieving a healthy planet and healthy people. Such efforts share some of the same concerns and methods as in higher income countries, but there are important differences. By engaging in the sustainability concerns of lower-income countries, Stanford can invigorate student enthusiasm and elevate Stanford's contribution and impact.

The progressive, anthropogenically driven degradation of the earth systems has been well documented over the last 50 years. A key driver of this progressive destruction is that our economic system rewards people who destroy the environment. Clearcutting rain forests, soil-degrading till agriculture, overfishing, and emitting harmful pollutants are all rewarded financially. If the economic system continues to reward environmental destruction, then people will continue to destroy the environment. In many high-income countries, regulation has reduced environmental destruction, but low-income countries are commonly weak states that have limited capacity to enforce environmental regulations. Moreover, higher income countries hand off their most polluting activities to lower income countries.

Transitioning to an economic system that simultaneously supports human livelihoods and preserves the environment is a global challenge. The concept of a "circular economy", modeled on ecological systems, is well-developed in the industrial ecology literature. In place of a linear economy that extracts natural resources and creates products and wastes, a circular economy is designed so that industrial byproducts function as raw materials for other parts of the economy. If supported by sufficient renewable energy, a circular economy that preserves the biosphere is theoretically possible. The primary barrier in moving from theory to practice is developing scalable business models that utilize appropriate processes and technologies and generate income and livelihoods without environmental degradation.

We propose addressing this difficult problem in low-resource settings -- where most people live, where population growth continues to increase demand, and where much of the world's environmental degradation occurs, even though consumption is skewed to wealthy countries. By

working with partners in lower income countries and engaging Stanford faculty, staff and students in multidisciplinary, cross-cultural iterative development, we can help communities create livelihoods and preserve the environment for future generations.

### **Approach**

We will begin by conducting scoping exercises to identify existing industries with business models that undermine human and environmental health in Bangladesh (where we have broad existing relationships). We will engage stakeholders including business owners and operators; local researchers with interests in public health, sustainability and economic development; government officials, development banks, Stanford faculty and students, and the Ellen MacArthur Foundation (which focuses on business model development for a circular economy). We will brainstorm and iteratively develop alternative business models that would provide employment and profitability, but would neither harm community health nor compromise the opportunity of future generations to meet their needs.

Candidate focus areas include industries that contribute substantially to air pollution that undermines both human health and climate. Industries that generate black carbon are a particularly attractive opportunity to achieve a dual health and environmental benefits. Industries in Bangladesh that generate substantial black carbon include power generation, brick manufacturing and transport. Other candidates for early transition towards a circular economy include reducing food waste in agriculture, capturing methane, working towards sustainable aquaculture and sustainable topsoil management.

By the end of the first year, we will have 2-3 well-developed plans to introduce an alternative business model that advances towards a circular economy in Bangladesh. In subsequent years we envision piloting and iteratively developing these models to demonstrate commercial viability and environmental impact compared with existing business models. We will engage entrepreneurs in Bangladesh and work towards adoption of these new models.

In the second year, we will also work to identify a site in sub-Saharan Africa to apply this same approach. We will leverage the Stanford/London School of Hygiene and Tropical Medicine Planetary Health Fellowship, to add personnel, institutional connections and resources to support these efforts. Multiple examples of sustainable enterprises will allow us to identify principles and approaches for global uptake.

COVID-19 will limit travel in the first year, but we will leverage our many collaborations in Bangladesh to advance planning through the combined use of targeted virtual meetings, and progressive development of ideas through co-developed document.

**Example:** The emissions from coal-fired brick kilns across South Asia affect the global climate as much as the US passenger car fleet. Air pollution from brick kilns surrounding Dhaka, the capital city of Bangladesh, results in an estimated 5000 deaths each year. Our engagement with stakeholders in Bangladesh identifies inattention to the incentives of brick manufacturers as a key reason for failure of prior policy initiatives to improve the situation. We have identified several low-cost improvements in kiln design and operation that by improving combustion efficiency would reduce coal consumption, increase profitability and reduce emissions. Stanford students and faculty who have contributed to these efforts include economists, political scientists, epidemiologists, physicians, engineers, earth scientists, computer scientists, electrical engineers and mechanical engineers. With focused attention we can develop a sound business model that reduces environmental and health harm. This will also build a relationship that will support progressive improvement over time.