Chapter 8

DEVELOPMENT AND "UNDERDEVELOPMENT"

Article 8.1

FAMINE MYTHS

Five Misunderstandings Related to the 2011 Hunger Crisis in the Horn of Africa

BY WILLIAM G. MOSELEY

March/April 2012

The 2011 famine in the horn of Africa was one of the worst in recent decades in terms of loss of life and human suffering. While the UN has yet to release an official death toll, the British government estimates that between 50,000 and 100,000 people died, most of them children, between April and September of 2011. While Kenya, Ethiopia, and Djibouti were all badly affected, the famine hit hardest in certain (mainly southern) areas of Somalia. This was the worst humanitarian disaster to strike the country since 1991-1992, with roughly a third of the Somali population displaced for some period of time.

Despite the scholarly and policy community's tremendous advances in understanding famine over the past 40 years, and increasingly sophisticated famine early-warning systems, much of this knowledge and information was seemingly ignored or forgotten in 2011. While the famine had been forecasted nearly nine months in advance, the global community failed to prepare for, and react in a timely manner to, this event. The famine was officially declared in early July of 2011 by the United Nations and recently (February 3, 2012) stated to be officially over. Despite the official end of the famine, 31% of the population (or 2.3 million people) in southern Somalia remains in crisis. Across the region, 9.5 million people continue to need assistance. Millions of Somalis remain in refugee camps in Ethiopia and Kenya.

The famine reached its height in the period from July to September, 2011, with approximately 13 million people at risk of starvation. While this was a regional problem, it was was most acute in southern Somalia because aid to this region was much delayed. Figure 1 provides a picture of food insecurity in the region in the November-December 2011 period (a few months after the peak of the crisis).

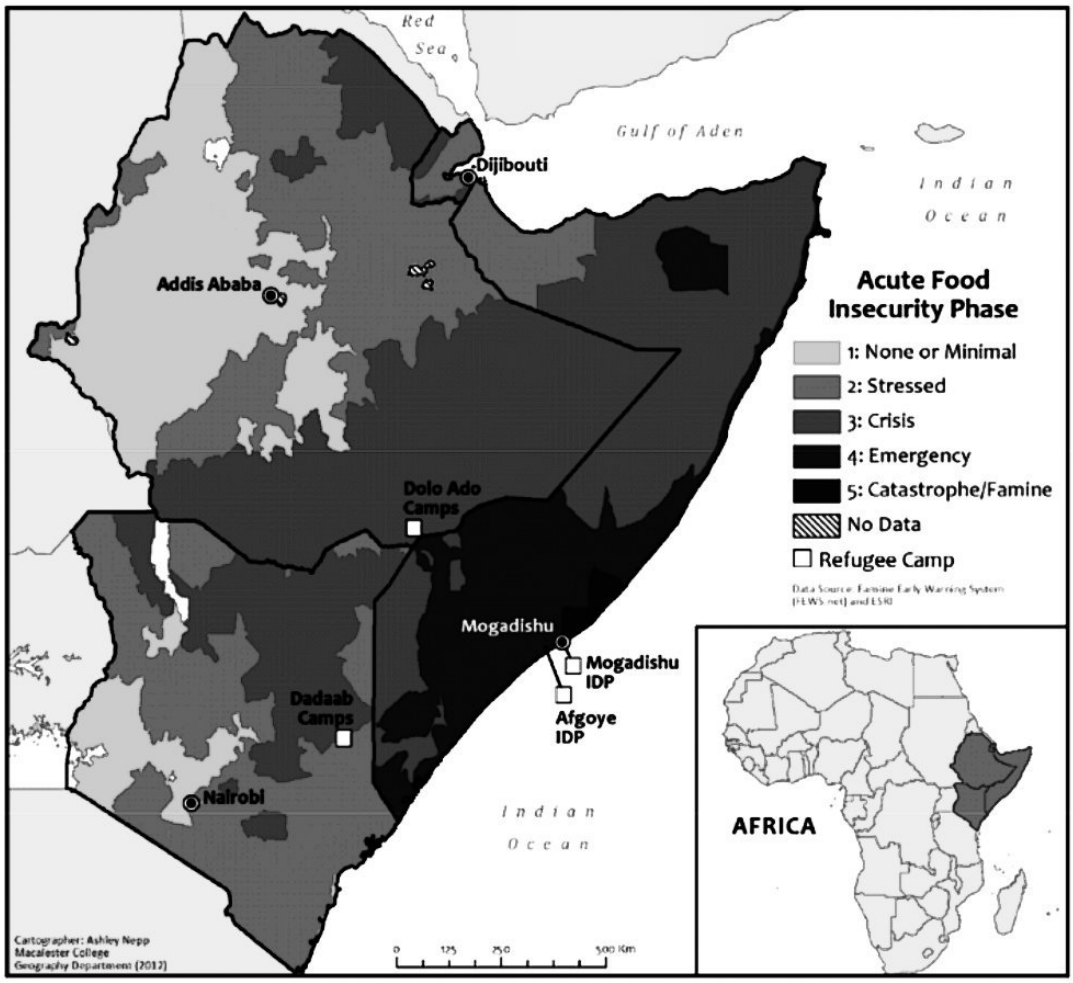
The 2011 famine received relatively little attention in the U.S. media and much of the coverage that did occur was biased, ahistorical, or perpetuated long-held misunderstandings about the nature and causes of famine. This article addresses "famine myths"—five key misunderstandings related to the famine in the Horn of Africa.

Myth #1: Drought was the cause of the famine.

While drought certainly contributed to the crisis in the Horn of Africa, there were more fundamental causes at play. Drought is not a new environmental condition for much of Africa, but a recurring one. The Horn of Africa has long experienced erratic rainfall. While climate change may be exacerbating rainfall variability, traditional livelihoods in the region are adapted to deal with situations where rainfall is not dependable.

The dominant livelihood in the Horn of Africa has long been herding, which is well adapted to the semi-arid conditions of the region. Herders traditionally ranged widely across the landscape in search of better pasture, focusing on different areas depending on meteorological conditions.

FIGURE 1: FOOD INSECURITY IN THE HORN OF AFRICA REGION, NOVEMBER-DECEMBER 2011.



Based on data and assessment by FEWS-Net (a USAID-sponsored program).

Cartography by Ashley Nepp, Macalester College.

The approach worked because, unlike fenced in pastures in America, it was incredibly flexible and well adapted to variable rainfall conditions. As farming expanded, including large-scale commercial farms in some instances, the routes of herders became more concentrated, more vulnerable to drought, and more detrimental to the landscape.

Agricultural livelihoods also evolved in problematic ways. In anticipation of poor rainfall years, farming households and communities historically stored surplus crop production in granaries. Sadly this traditional strategy for mitigating the risk of drought was undermined from the colonial period moving forward as households were encouraged (if not coerced by taxation) to grow cash crops for the market and store less excess grain for bad years. This increasing market orientation was also encouraged by development banks, such as the World Bank, International Monetary Fund, and African Development Bank.

The moral of the story is that famine is not a natural consequence of drought (just as death from exposure is not the inherent result of a cold winter), but it is the structure of human society which often determines who is affected and to what degree.

Myth #2: Overpopulation was the cause of the famine.

With nearly 13 million people at risk of starvation last fall in a region whose population doubled in the previous 24 years, one might assume that these two factors were causally related in the Horn of Africa. Ever since the British political economist

Land Grabs in Africa

Long term leases of African land for export-oriented food production, or "land grabs," have been on the rise in the past decade. Rather than simply buying food and commodity crops from African farmers, foreign entities increasingly take control of ownership and management of farms on African soil. This trend stems from at least two factors. First, increasingly high global food prices are a problem for many Asian and Middle Eastern countries that depend on food imports. As such, foreign governments and sovereign wealth funds may engage in long-term leases of African land in order to supply their own populations with affordable food. Secondly, high global food prices are also seen as an opportunity for some Western investors who lease African land to produce crops and commodities for profitable global markets.

In the Horn of Africa, Ethiopia (which has historically been one of the world's largest recipients of humanitarian food aid) has made a series of long-term land leases to foreign entities. The World Bank estimates that at least 35 million hectares of land have been leased to 36 different countries, including China, Pakistan, India and Saudi Arabia. Supporters of these leases argue that they provide employment to local people and disseminate modern agricultural approaches. Critics counter that these leases undermine food sovereignty, or people's ability to feed themselves via environmentally sustainable technologies that they control.

Thomas Malthus wrote "An Essay on the Principle of Population" in 1798, we have been concerned that human population growth will outstrip available food supply. While the crisis in Somalia, Ethiopia and Kenya appeared to be perfect proof of the Malthusian scenario, we must be careful not to make overly simplistic assumptions.

For starters, the semi-arid zones in the Horn of Africa are relatively lightly populated compared to other regions of the world. For example, the population density of Somalia is about 13 persons per sq. kilometer, whereas that of the U.S. state of Oklahoma is 21.1. The western half of Oklahoma is also semi-arid, suffered from a serious drought in 2011, and was the poster child for the 1930s Dust Bowl. Furthermore, if we take into account differing levels of consumption, with the average American consuming any times more than the average Somali does in a normal year, then Oklahoma's population density of 21.1 persons per sq. kilometer equates to that of 591 Somalis.

Despite the fact that Oklahoma's per capita impact on the landscape is over 45 times that of Somalia (when accounting for population density and consumption levels), we don't talk about overpopulation in Oklahoma. This is because, in spite of the drought and the collapse of agriculture, there was no famine in Oklahoma. In contrast, the presence of famine in the Horn of Africa led many to assume that too many people was a key part of the problem.

Why is it that many assume that population growth is the driver of famine? For starters, perhaps we assume that reducing the birthrate, and thereby reducing the number of mouths to feed, is one of the easiest ways to prevent hunger. This is actually a difficult calculation for most families in rural Africa. It's true that many families desire access to modern contraceptives, and filling this unmet need is important. However, for many others, children are crucial sources of farm labor or important wage earners who help sustain the family. Children also act as the old-age social security system for their parents. For these families, having fewer children is not an easy decision. Families in this region will have fewer children when it makes economic sense to do so. As we have seen over time and throughout the world, the average family size shrinks when economies develop and expectations for offspring change.

Second, many tend to focus on the additional resources required to nourish each new person, and often forget the productive capacity of these individuals. Throughout Africa, some of the most productive farmland is in those regions with the highest population densities. In Machakos, Kenya, for example, agricultural production and environmental conservation improved as population densities increased. Furthermore, we have seen agricultural production collapse in some areas where population declined (often due to outmigration) because there was insufficient labor to maintain intensive agricultural production.

Third, we must not forget that much of the region's agricultural production is not consumed locally. From the colonial era moving forward, farmers and herders have been encouraged to become more commercially oriented, producing crops and livestock for the market rather than home consumption. This might have been a reasonable strategy if the prices for exports from the Horn of Africa were high (which they rarely have been) and the cost of food imports low. Also, large land leases (or "land grabs") to foreign

governments and corporations in Ethiopia (and to a lesser extent in Kenya and Somalia) have further exacerbated this problem. These farms, designed solely for export production, effectively subsidize the food security of other regions of the world (most notably the Middle East and Asia) at the expense of populations in the Horn of Africa. These trends are consistent with the Amartya Sen's insight that, throughout history, most famines are not the result of an absolute lack of food or production, but rather a situation where the hungry do not have access to the food being produced.

Myth #3: Increasing food production through advanced techniques will resolve food insecurity over the long run.

As Sub-Saharan Africa has grappled with high food prices in some regions and famine in others, many experts argue that increasing food production through a program of hybrid seeds and chemical inputs (a so-called "New Green Revolution") is the way to go.

While outsiders benefit from this New Green Revolution strategy (by selling inputs or purchasing surplus crops), it is not clear if the same is true for small farmers and poor households in Sub-Saharan Africa. For most food insecure households on the continent, there are at least two problems with this strategy. First, such an approach to farming is energy intensive because most fertilizers and pesticides are petroleum based. Inducing poor farmers to adopt energy-intensive farming methods is short sighted, if not unethical, if experts know that global energy prices are likely to rise. Second, irrespective of energy prices, the New Green Revolution approach requires farmers to purchase seeds and inputs, which means that it will be inaccessible to the poorest of the poor, i.e., those who are the most likely to suffer from periods of hunger. In order to improve access, or "entitlements," to use Amartya Sen's language, we need low cost approaches that are accessible to poor farmers.

If not the New Green Revolution approach, then what? Many forms of bio-intensive agriculture are, in fact, highly productive and much more efficient than those of industrial agriculture. For example, crops grown in intelligent combinations allow one plant to fix nitrogen for another rather than relying solely on increasingly expensive, fossil fuel-based inorganic fertilizers for these plant nutrients. Mixed cropping strategies are also less vulnerable to insect damage and require little to no pesticide use for a reasonable harvest. These techniques have existed for centuries in the African context and could be greatly enhanced by supporting collaboration among local people, African research institutes, and foreign scientists.

Myth #4: U.S. foreign policy in the Horn of Africa was unrelated to the crisis.

Many Americans assume that U.S. foreign policy bears no blame for the food crisis in the Horn and, more specifically, Somalia. This is simply untrue. The weakness of

the Somali state was and is related to U.S. policy, which interfered in Somali affairs based on Cold War politics (the case in the 1970s and 80s) or the War on Terror (the case in the 2000s).

During the Cold War, Somalia was a pawn in a U.S.-Soviet chess match in the geopolitically significant Horn of Africa region. In 1974, the U.S. ally Emperor Haile Selassie of Ethiopia was deposed in a revolution. He was eventually replaced by Mengistu Haile Mariam, a socialist. In response, the leader of Ethiopia's bitter rival Somalia, Siad Barre, switched from being pro-Soviet to pro-Western. Somalia was the only country in Africa to switch Cold War allegiances under the same government. The U.S. supported Siad Barre until 1989 (shortly before his demise in 1991). By doing this, the United States played a key role in supporting a long-running dictator and undermined democratic governance.

More recently, the Union of Islamic Courts (UIC) came to power in 2006. The UIC defeated the warlords, restored peace to Mogadishu for the first time in 15 years, and brought most of southern Somalia under its orbit. The United States and its Ethiopian ally claimed that these Islamists were terrorists and a threat to the region. In contrast, the vast majority of Somalis supported the UIC and pleaded with the international community to engage them peacefully. Unfortunately, this peace did not last. The U.S.-supported Ethiopian invasion of Somalia begun in December 2006 and displaced more than a million people and killed close to 15,000 civilians. Those displaced then became a part of last summer and fall's famine victims.

The power vacuum created by the displacement of the more moderate UIC also led to the rise of its more radical military wing, al-Shabaab. Al-Shabaab emerged to engage the Transitional Federal Government (TFG), which was put in place by the international community and composed of the most moderate elements of the UIC (which were more favorable to the United States). The TFG was weak, corrupt, and ineffective, controlling little more than the capital Mogadishu, if that. A low-grade civil war emerged between these two groups in southern Somalia. Indeed, as we repeatedly heard in the media last year, it was al-Shabaab that restricted access to southern Somalia for several months leading up to the crisis and greatly exacerbated the situation in this sub-region. Unfortunately, the history of factors which gave rise to al-Shabaab was never adequately explained to the U.S. public. Until July 2011, the U.S. government forbade American charities from operating in areas controlled by al-Shabaab—which delayed relief efforts in these areas.

Myth #5: An austere response may be best in the long run.

Efforts to raise funds to address the famine in the Horn of Africa were well below those for previous (and recent) humanitarian crises. Why was this? Part of it likely had to do with the economic malaise in the U.S. and Europe. Many Americans suggested that we could not afford to help in this crisis because we had to pay off our own debt. This stinginess may, in part, be related to a general misunderstanding about how much of the U.S. budget goes to foreign assistance. Many Americans assume we spend over 25% of our budget on such assistance when it is actually less than 1%.

Furthermore, contemporary public discourse in America has become more inward-looking and isolationist than in the past. As a result, many Americans have difficulty relating to people beyond their borders. Sadly, it is now much easier to separate ourselves from them, to discount our common humanity, and to essentially suppose that it's okay if they starve. This last point brings us back to Thomas Malthus, who was writing against the poor laws in England in the late 18th century. The poor laws were somewhat analogous to contemporary welfare programs and Malthus argued (rather problematically) that they encouraged the poor to have more children. His essential argument was that starvation is acceptable because it is a natural check to over-population. In other words, support for the poor will only exacerbate the situation. We see this in the way that some conservative commentators reacted to last year's famine.

The reality was that a delayed response to the famine only made the situation worse. Of course, the worst-case scenario is death, but short of death, many households were forced to sell off all of their assets (cattle, farming implements, etc.) in order to survive. This sets up a very difficult recovery scenario because livelihoods are so severely compromised. We know from best practices among famine researchers and relief agencies in that you not only to detect a potential famine early, but to intervene before livelihoods are devastated. This means that households will recover more quickly and be more resilient in the face of future perturbations.

Preventing Famines

While the official famine in the horn of Africa region is over, 9.5 million people continue to need assistance and millions of Somalis remain in refugee camps in Ethiopia and Kenya. While this region of the world will always be drought prone, it needn't be famine prone. The solution lies in rebuilding the Somali state and fostering more robust rural livelihoods in Somalia, western Ethiopia and northern Kenya. The former will likely mean giving the Somali people the space they need to rebuild their own democratic institutions (and not making them needless pawns in the War on Terror). The latter will entail a new approach to agriculture that emphasizes food sovereignty, or locally appropriate food production technologies that are accessible to the poorest of the poor, as well as systems of grain storage at the local level that anticipate bad rainfall years. Finally, the international community should discourage wealthy, yet food-insufficient, countries from preying on poorer countries in Sub Saharan African countries through the practice of land grabs. ❑

Sources: Alex de Waal, *Famine That Kills: Darfur, Sudan*, Oxford University Press, 2005; William G. Moseley, "Why They're Starving: The man-made roots of famine in the Horn of Africa," *The Washington Post*. July 29, 2011; William G. Moseley and B. Ikubolajeh Logan, "Food Security," in B. Wisner, C. Toulmin and R. Chitiga (eds)., *Toward a New Map of Africa*, Earthscan Publications, 2005; Abdi I. Samatar, "Genocidal Politics and the Somali Famine," Aljazeera English, July 30, 2011; Amartya Sen, *Poverty and Famines*, Oxford/Clarendon, 1981; Michael Watts and Hans Bohle, "The space of vulnerability: the causal structure of hunger and famine," *Progress in Human Geography*, 1993.

Article 11.2

WHY SOME LEADERS IN POORER COUNTIRES ARE CHAMPIONING THE ENVIRONMENT

BY ROBIN BROAD AND JOHN CAVANAGH

July 2015; Triple Crisis Blog

We have heard surprise expressed that two religious leaders from poorer countries, Pope Francis from Argentina and Cardinal Turskon from Ghana, have emerged as leading voices for action on the environment with their compelling June 2015 encyclical. The surprise comes from the assumption that poorer countries invariably prioritize economic growth and financial revenues—not the environment—and that only when beyond a certain threshold of per capita income do they shift priorities and take action in favor of the environment. As many readers know, this theory that only richer people in richer countries care about the environment is what some call the Environmental Kuznets Curve or the post-materialist hypothesis.

Our research on decisive action to protect the environment in El Salvador and Costa Rica suggests that this stereotype is outdated and the theory wrong. We zeroed in on El Salvador and Costa Rica because both have halted potentially lucrative metallic mining within the last decade due to its negative environmental impact.

In our new article in the journal *World Development*, we ask "why did these two governments do this?" Our goal now is to share our answers to that question. We posit three conditions under which governments of poorer countries take action to protect the environment, at times sacrificing large-scale financial gain:

(1) The first condition is related to civil society: Poorer people, whose natural resource base is threatened by mining, can move from individual awareness to concern, to become organized, and then to engage with other sectors of civil society in pressuring their government to implement policy changes. This involves a combination of poorer people who have lived in the area long enough to grasp the environmental damage, with other segments of domestic civil society providing additional support and voice. Organizing begins locally in the mining areas but moves to a national level, putting pressure on governments.

(2) The second condition is related to domestic business elites: In our case studies, we find that segments of the domestic economic elite who have interests based in protecting natural resources are more powerful than the elite and corporate interests that benefit from exploiting minerals. The power of global corporations is not strong enough, or is not connected enough to local economic elites, to change this calculus. Thus, foreign mining firms that want to mine often move from the national level (where they have not been successful) into the global arena, where they sue the governments under investment agreements and investor-state dispute structures.

(3) The third condition is related to governments: We find that individuals and agencies within democratic governments who are willing and able not only to respond to civil society, but also to understand the ecological realities of natural-resource exploitation, can play a central role. We also find that far-sighted political leaders or bureaucrats, regardless of their party's politics, who come into office with either an understanding of environmental issues or a willingness to listen to non-governmental experts, can also become catalysts.

In both Salvadoran and Costa Rican mining policy, all three of these conditions came into play and reinforced one another, leading to decisive government action to halt environmentally destructive mining. In both countries, there was strong local citizen opposition to mining that combined with other civil society actors to form powerful national movements against mining. In El Salvador, rural farmers and communities provided the initial spark, with the church playing a significant integral role. In Costa Rica, rural communities were crucial, but urban environmentalists played an important role, as did academics and the media.

In terms of the business sector: in both countries, local and national business interests collectively had more to lose than gain from industrial mining and its ensuing environmental damage. In El Salvador, the farming and tourism sectors need water that mining seemed likely to further contaminate. The economic elites connected to these sectors were more numerous and powerful than local businesses that would benefit from foreign mining companies gaining mining concessions. In Costa Rica, the many sectors that benefit from eco-tourism (and agriculture) are similarly more numerous and powerful than the relatively small mining sector.

As for government, in both countries, at different times, there were key individuals and sometimes whole agencies within government who spoke out or took action against mining.

Comparing the influence of the three conditions: The first two conditions, strong civil society and weak pro-mining domestic business elites, seem particularly important since the recent histories of both El Salvador and Costa Rica reveal much more variation within key government agencies during the period in question. In El Salvador, even a relatively corrupt and pro-foreign business administration such as Antonio Saca's (2004-2009) could take action against gold mining given the country's strong civil society and weak pro-mining national business elites in the context of the country's extreme environmental degradation. In this case, individuals in the Saca government did indeed make a difference. And, in Costa Rica, there is the two-year period of 2008-2010 when, even with strong civil society, weak pro-mining national business elites, and a democratic government, the administration of Óscar Arias (who one might have assumed to be more pro-environment than the Saca administration) gave permission for Canadian firm Infinito Gold to mine at a very controversial site. Yet, even in this instance, a strong civil society and an independent Supreme Court eventually overturned Arias's pro-mining policies and stopped Infinito's mining.

The key point is that these two governments halted environmentally destructive gold mining even though both are relatively poor, small countries which would, according to conventional theory, choose short-term economic gains over longer-term environmental concerns.

Based on this work, we were not at all surprised that it was two religious leaders from poorer countries who have emerged as among the most vocal voices for action on environment (including climate). ❑

Sources: Robin Broad, "The Poor and the Environment: Friends or foes?" *World Development*, 22(6), June 1994; Robin Broad, "Corporate Bias in the World Bank Group's International Centre for Settlement of Investment Disputes: A Case Study of a Global Mining Corporation Suing El Salvador," *University of Pennsylvania Journal of International Law* 36 (2015); Robin Broad and John Cavanagh, "El Salvador Gold: Toward a Mining Ban," in Thomas Princen, Jack P. Martin, and Pamela L. Manno, eds., *Ending the Fossil Fuel Era* (MIT Press, 2015).

Article 11.3

AUSTERITY-OBSESSED EUROPE COULD COMBAT CLIMATE CHANGE WITHOUT RAISING TAXES

BY DEAN BAKER

September 2019, Truthout

In the United States, there has been much attention given to the various proposals for a Green New Deal. While there have been legitimate questions about paying for a large push to reduce greenhouse gas emissions, many accept the need for such measures for the survival of the planet.

However, there has been less attention paid to the failure of European countries to act in this area, in spite of the fact that a substantial program would be virtually costless for Europe. There has been far more attention paid to the politics around Brexit in the United Kingdom than to the important question of how Europe will address global warming.

Just to be clear, the European countries have been far better global citizens in this area than the United States. Their per-person emissions are roughly half as much as the United States. Furthermore, many European countries have already taken aggressive measures to promote clean energy and encourage conservation.

But in the battle to slow global warming, simply doing better than the United States is not good enough. The European Union can and must do more to reduce its greenhouse gas emissions.

This is where the continent's mindless push for austerity comes into the picture. European governments, led by Germany, have become obsessed with keeping deficits low and balancing budgets. Most have small deficits or even budget surpluses.

Germany exemplifies the European austerity obsession with a budget surplus that is close to 2.0% of GDP ($420 billion in the U.S. economy). To some extent, fiscal austerity is not a choice. The eurozone's rules require low budget deficits for the countries that use the euro, but even countries outside the eurozone have joined the austerity party. The United Kingdom has a budget deficit of less than 1.5% of GDP, Denmark less than 0.5% of GDP, and Sweden has a budget surplus of close to 0.5% of GDP.

There are certainly circumstances under which budget deficits can be too high, but these clearly do not apply to the countries in the European Union at present. Inflation has been persistently low and has been falling in recent months. The inflation rate for the eurozone countries has averaged just 1.0% over the last 12 months.

The story is even more dramatic if we look at interest rates. The classic problem of a large budget deficit is that it leads to high interest rates that crowd out investment. Not only are interest rates extraordinarily low across Europe, in many countries, investors have to pay governments to lend them money.

The interest rate on a 10-year government bond in France is -0.43%. In the Netherlands, it is -0.57%, and in Germany it is -0.71%. That means investors have to pay Germany 0.71% annually to lend the government money.

This is the context in which the concern for low budget deficits in these countries is utterly mindless. The financial markets are effectively begging these governments to borrow more money, but they refuse to do so.

The need to address global warming makes this refusal especially painful. The fact that interest rates and inflation are so low indicates that these governments are needlessly sacrificing growth and jobs. That story is bad enough, but the picture is much worse when we consider the pressing need to address global warming.

These governments could either pay directly to install solar and wind power, or provide large subsidies to businesses and homeowners. They could be subsidizing the switch to electric cars and making mass transit cheap or free, while they vastly ramp up capacity. They could also be providing large subsidies to countries in the global South to take the same measures, and to also save the rainforest in the Amazon.

The best part of this story is that they don't need to raise taxes to pay for this spending. There is considerable slack in these economies, which means that they can devote several hundred billion dollars annually to slow global warming without requiring additional taxes from their populations. It is possible that a really ambitious program, which might be needed, will require additional tax revenue, but for now, these countries are needlessly leaving money on the table while the planet burns.

It is common in policy circles to ridicule U.K. Prime Minister Boris Johnson for his seemingly mindless pursuit of Brexit. While Johnson surely deserves much ridicule, the proponents of austerity deserve a much larger dose. Keeping people out of work by failing to take more aggressive steps to address global warming is far more clownish than anything that Boris Johnson is doing with Brexit. ❑

Article 11.6

IS ECONOMIC GROWTH ENVIRONMENTALLY SUSTAINABLE?

BY ARTHUR MacEWAN

January/February 2018

Dear Dr. Dollar:

I keep hearing progressive economists talking about environmental sustainability, in particular in the context of the looming catastrophe of global climate change. But when it comes to macroeconomics, they seem to switch to talking "growth, growth, growth." Aren't the two contradictory?

—*Anonymous, Washington, D.C.*

The first law of ecology is that everything is related to everything else.

—Barry Commoner

As is the case with many questions, the answer is "yes and no."

Economic growth of the kind we have had for the last two hundred years—or longer—is in conflict with environmental sustainability. More growth has meant the use of more carbon-based fuels, so this growth has spewed more and more carbon dioxide into the atmosphere—and thus global warming. (Global warming is not the only environmental issue, but it is the danger that threatens the existence of human society as we know it. So let's focus on it here.)

Yet, the carbon intensity of economic growth is not something beyond social control. There are ways to grow—meeting human needs and desires—that greatly reduce, if not eliminate, the global warming impact. Most macroeconomic analyses, however, focus simply on growth without consideration of how this growth would affect the environment. There are two reasons for this error, one bad and one good.

The bad reason is that most economists take the basic arrangements of society for granted. They take the nature of technology as "given," and do not question either the technology itself or the social and political forces that maintain the existing path of technology.

The good reason is that we have more than one problem, and growth can provide positive social outcomes—reducing unemployment, general economic insecurity, and absolute poverty. None of this does any good if we are all soon washed away by rising tides, but it is a good reason that economic growth cannot be jettisoned out of hand.

Some Context

The environmental impact of human activity can be understood in terms of three factors:

- how many of us there are on the planet (population),
- the amount of output of goods and services produced per person (affluence), and
- the amount of environmental impact per unit of output (technology).

Over time, in terms of environmental impact, all three components of this relationship have gotten worse: population has grown and grown, the world as a whole has become more affluent, and technology has become more carbon intensive (more negative impact per unit of output). To halt global warming, it is necessary to pay attention to each of these factors.

What Can Change?

Population growth, at least in the long-run, can be reduced. Making contraception safe and widely available can help. Also, increased educational and employment opportunities for women tend to reduce fertility. But many people, especially in the agricultural sectors of low-income economies, choose to have several children. Children are their security, providing more hands to do a family's work and providing support for aging parents. Without greater affluence—hard to attain without economic growth—population will continue to grow. (That the most rapid population growth in the world is centered in African countries, which are among the least prosperous, illustrates the point.)

Curtailing economic growth as a means to contain environmental destruction has at least two main problems. First, unless it involves a massive, global redistribution of income and wealth, it condemns those at the bottom (countries and people) to their current economic level—both morally reprehensible and probably politically impossible. It is also probably politically impossible to overcome the obstacles to a massive redistribution. There are about 7.5 billion people in the world and total production is about $125 trillion, which means that average income is about $16,667. With no growth and redistribution getting everyone to this level, it would be necessary to reduce average income in the United States by over 70%, and in the Euro area and Japan by over 60%.

The second barrier to curtailing growth is that capitalism, which is pretty much the operating system of the whole world these days, is like a bicycle: If it stops, it (and the rider) falls over. The system depends on profits, and profits depend on either growth or redistributing income upward, and the latter has its limits. Getting rid of capitalism, running the world economy a different way, could have salutary results—though other social systems can do, and have done, substantial damage to the environment. Certainly, the political problems of getting rid of capitalism and insuring that its replacement would be environmentally friendly is a politically daunting tasks.

The Technology Option

Dealing with global warming needs to involve inhibiting population growth and curtailing economic growth—which means at least sharply constraining capitalism. But that's not enough. There need to be dramatic changes in the technology. At the present time, the most promising energy production technologies are wind power and photovoltaics. Also, energy conservation has great potential for reducing the emissions of greenhouse gases.

The effectiveness of the technology option has been demonstrated in other countries. As Frank Ackerman points out in "Are Nuclear Plant Closures a Mistake?" (Article 5.3), renewable electricity generation expanded from 5% of total German power consumption in 1999 to over 30% in 2015. Over the same period, Ackerman concludes, "there has been no increase in [carbon] emisions from the electric sector ... [and] the reliability of the German electric system has continued to improve."

The problem, then, is not so much technical (i.e., developing ways to reduce emissions). The problem is political. Halting subsidies to the fossil fuel industries and providing support for environmentally friendly technological change would be good beginnings. Also, a great deal could be accomplished through encouragement of energy conservation programs. Further steps will require major limitations on firms' operations, limitations that prevent them from ignoring the health, safety, and, ultimately, the survival of the populations. A difficult task, of course, but we really have no choice. ❑