POLICY RECOMMENDATIONS TO THE WORLD BANK

BIOSPHERE SMART AGRICULTURE IN A TRUE COST ECONOMY

TRUE COST OF FOOD AND AGRICULTURE INDEX ● Amount of soil lost worldwide, according to the U.N. Food and Agriculture Organization (FAO): 75 billion tons ● Approximate annual economic cost of that lost soil: US $ 400 billion, or about US $ 70 per person, per year (FAO) ● Approximate percentage of the world's population that is now overweight or obese, according to the McKinsey Global Institute: 30 percent ● Estimated global economic impact related to the health costs of that nutritional crisis: US$2 trillion annually, or 2.8 percent of global GDP ● Percentage of the Earth's freshwater resources now diverted for agriculture: 70 percent ● Number of major underground water reservoirs designated as beyond "sustainability tipping points" according to researchers at the University of California at Irvine: 21 of 37 ● Number of impacted marine and riverine ecosystems known as Dead Zones due to excess nutrients greatly affected by agriculutral production: 400 ● Probability that the planet will warm by 4 degrees Celsius (7.2 degrees Fahrenheit) by the end of the century according to the World Bank: at least 40 percent ● Estimated amount that crop yields are projected to decrease if temperatures rise above 2 degress C: 15 to 20 percent (WB) ● Percentage of people in low-income countries who work in agriculture: 60% (WB) ● Estimated health costs of global pesticide applications, a problem barely studied: US$1.1 billion per year. (Pesticide Action Network) ● Estimated amount of global food production classified as food waste: 30 to 40 percent ● Estimated global costs of food waste when environmental and social impacts are included according to Food Wastage Footprint: US$2.6 trillion per year

September 2015, Washington DC,

Our findings and recommendations are relatively simple, yet profound. There is an urgent need for mulitlateral development banks to:

1. Set up internal procedures to identify and quantify the ecological impact "externalities," especially at the agricultural loan application stage to show the True Cost of production;
2. Size those externalities up against the planet's already overloaded ecological limits (Planetary Boundaries);
3. Say no to additionally damaging agricultural projects, while financing the most ecologically restorative farming alternatives incorporating Biosphere Smart Agriculture; and
4. Incentivize loan officers to follow a stringent True Cost safeguard process with all development loans.

Studies indicate that an ecological farming or agroecology approach will most effectively address issues such as adapting to climate change, building fertile carbon rich soil, capturing groundwater, feeding people healthy food, and creating real job and food security.

Over the more than two-hundred-year course of the industrial revolution we have ignored nature's carrying capacity limits. Agriculture has been a key driver in this crisis. It is essential that we simultaneously reverse trends now causing the extinction of a great percentage of Earth's plants and animals, halt the overheating of the planet, and stop creating dead zones in the oceans.

Time is now much less on our side. The near-term power dynamics to solve these overarching problems are not in our favor, yet we must confront this clearly flawed current economic system. A rapid shift from a heavily polluting industrial society to a more holistic and responsible approach is the critical challenge at hand.

Such a shift is our only hope to achieve a more resilient economy and provide for this and future generations. Our conclusions articulate three fundamental changes in the economic model and approach to agriculture necessary for the shift: **carrying capacity** limit & risk analysis, a **True Cost Economy,** and **green infrastructure only**.

Conservation leader David Brower explained the industrial economy's most important failing – not calculating the cost to the future and the cost to the earth. All banking should embrace the challenge to bring what could be called an earth-centered "True Cost Economy" into reality. Together we can rethink from the ground up restructured bank loans and move meaningfully towards a better world for all people and all time.

Randy Hayes, Executive Director, Foundation Earth

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"We need to rethink food in developing countries from the ground up."

- World Bank President Jim Yong Kim, "The Future of Food," April 2015

The importance of agriculture and food policy has changed over the decades as World Bank development strategies have evolved. Under structural adjustment policies of the 1980s and 1990s, domestic food production was often sacrificed in favor of export-oriented commodity crops, increasing the vulnerability of the poor in many lower-income countries. Today, agriculture and food policy is front and center as the World Bank attempts to undo some of these past wrongs through the goal of feeding "every person, everywhere, every day." But there are no easy fixes. Already 800 million people are chronically hungry[2] with the human population expected to reach over 9.6 billion by 2050[3]. Agriculture is deeply affected by rising temperatures and violent storms yet at the same time is responsible for generating 25 to 30 percent of all greenhouse gas emissions.[4] Policies to boost food harvests and reverse poverty without increasing agriculture's impacts on the land, water, climate and web of life will require attending to all of the biosphere's critical life supporting systems, not just climate. We count nine.

A broad set of human rights, economic distribution, and social justice issues are paramount to authentic and long-term problem solving. Many excellent groups are focused on those fundamental concerns. This paper specifically addresses the integration of the full set of ecological considerations within the World Bank's agricultural loan program. Feeding people well certainly starts with sensible site specific practices based on an understanding of how each farm fits within its surrounding landscape. But the scale and reach of agriculture is wider than ever before. Combined with a supercharged global finance environment with expanding Multilateral Development Banks, private banks, government subsidies and giant self-funding agri-business operations, one must now look at agriculture's collective impacts on the biosphere's ecological systems. Fixing the front end of this loan screening criteria problem is the impetus for this report. We highlight some accounting frameworks and incentive system issues that the Bank could use to redesign its ecological risk analysis in the agricultural lending program in order to advance an ecologically sound food system that eliminates hunger.

The next two years are critical for World Bank agriculture and food policies. Its Environmental and Social Safeguard Policies and 3-year Agricultural Action Plan are under review, and a multi-billion dollar program called Climate Smart Agriculture (CSA) is being developed. Together these activities constitute a critical window of opportunity to incorporate the true costs of industrial food production (including currently uncounted "externalities") in the Bank's lending criteria.

At the root of the global economic system is a failure to recognize and count the shifted impacts (financial and earth damaging costs) of a product beyond its market value. In the face of a rapidly overheating climate, collapsing fisheries, degraded soil, depleted water resources, vanishing species, and other challenges directly related to agriculture, we can no longer afford to pursue a flawed accounting system. Multilateral Development Banks (MDBs) such as the World Bank must identify a project's pollution externalities to help ensure that the most ecologically sensitive and socially positive production methods are financed and the ecologically destructive projects are not.

While our focus is on changing the World Bank lending evaluation process, our sights are also set on the broader economy. It is our hope that the World Bank and its agricultural and environmental policies can instigate a larger shift towards an ecologically holistic, systems-based approach to banking. The emergence of business leaders demanding a True Cost Economy[5] to resolve dire ecological problems would be one of the most significant developments of our time. Nothing could contribute more broadly to a dignified human existence for this and future generations.

Such a transformation by the World Bank would establish a critical precedent in the financial world. Civil society advocacy groups in the finance sector and other educable banks can help encourage a shift to this bold approach. By concentrating on the World Bank's agricultural policies, we will heighten the debate around the need for **Biosphere Smart Agriculture in a True Cost Economy** and in food production, processing, and consumption. Our ultimate goal is ecologically holistic systems-based thinking throughout the finance system, resulting in a cleaner planet, a healthier economy, and a better fed populace. A successful future for banking requires such a shift.

MAJOR FINDINGS

The major findings and recommendations are that all banks urgently need to:

- **Set up internal procedures to identify and quantify the ecological impacts (externalities), especially at the agricultural loan application stage;**
- **Size up those externalities against the planet's already overloaded ecological limits (Planetary Boundaries);**
- **Say no to additionally damaging agricultural projects, while financing ecologically restorative agroecology farming alternatives;**
- **Incentivize loan officers to follow a stringent safeguard process with all development loans.**

To achieve its integrated goals of ending poverty and combatting climate change World Bank specically should :

- **Shift the vast majority of agricultural funding to support agroecological practices;**
- **Make more loans of smaller amounts to a wider number of projects and endure the slightly higher transaction costs and; When necessary to make large loans, do so through intermediaries such as established farmer cooperatives;**
- **Utilize GEF grants (not loans) to facilitate South-to-South exchanges to increase regional food resilience by supporting local communities and farmers utilizing agroecological techniques;**
- **Fund direct country co-op capacity building and farmer-to-farmer networks where needed;**
- **Take a multi-stakeholder approach to investments to ensure that all affected communities are engaged, with negative feedback and positive synergies taken into account.**

ADDITIONAL CONSIDERATIONS:

- **Urgency:** According to the World Bank, we face at least a 40 percent chance that the planet will warm by 4 degrees Celsius (7.2 degrees Fahrenheit) by the end of the century. It is not certain that human adaptation to such temperature change is even feasible.[6]
- **Political Power Shift:** While the World Bank's financial power has been somewhat eclipsed quantitatively by a new generation of development banks, its leadership on environmentally and socially responsible investing remains critical.
- **Incremental Pollution Adds Up**: Incremental agricultural pollution and the resulting ecological impacts on the major life sustaining systems are producing tragic consequences. One example is the more than 400 dead zones in the oceans created by nitrogen and phosphorous runoff, primarily from industrial agriculture.[7]
- **Project Design:** The shifted costs or externalized ecological impacts of a project are typically not included in the financial and social goals articulated in loan requests by the time World Bank staff receive the paperwork. Hence, the ability to reduce ecological harm in the agricultural project is highly limited and therefore must be addressed head on in the application process.
- **Biosphere Smart Training:** Ministers and agency staff in the Finance, Agriculture, and Environment departments as well as bank staff need training programs to be able to assess the externalities (ecological impacts) that damage the planet's life-support-systems. These departments need to work together in order to spare their countries from suffering grave ecological, economic, public health, and political instability costs later on.
- **Weakening Commitment:** While the World Bank already has numerous social and environmental safeguards and programs that drive and support its essential tasks of poverty reduction, ending hunger and combatting climate change, there is good reason to fear lack of enforcement.[8] Civil society's review of (2015) draft safeguard revisions raised anxieties that existing policies will likely be weakened.

- **Market Shortcomings:** The risks of a global expansion of chemical-intensive agriculture and the grain- and meat-intensive modern Western diet are far greater than the market analysis perceives. There is currently a move in global financial markets to invest in commodity assets, including agriculture. Investment markets are now driving land grabs and a rise in industrial production of grains, oilseeds, livestock and other crops without regard to the long-term impacts of such development to affected communities and the planet's already damaged support systems.
- **Co-optation versus Leadership**: Stronger leadership is needed to ensure that the World Bank's Environmental and Social Safeguards, Agriculture Action Plan, Forest Action Plan and new Climate Smart Agriculture policy become stronger and are not co-opted by finance ministers hand in hand with multinational agribusiness interests via industrial production models. Biosphere Smart leadership is required to achieve food security and greater resilience to climate change.
- **Myth of Feeding the World:** Most transnational agribusiness corporations acknowledge the impacts of 20th century industrial agriculture. Yet they insist that new generations of similar technologies like "precision farming" (GPS guided fertilizer applications) and genetically modified crops (now resistant to even more toxic herbicides) represent our best path to feed the world. This approach is unlikely to alleviate poverty (quite the opposite) and will more likely dangerously exacerbate the stresses on planet's life support boundaries.
- **Longer-term Thinking:** While chemical-intensive agriculture systems might improve yields in the short-term, studies show that agroecological methods are generally more productive over the long-term.[9] They are also generally more resource conserving, resilient to violent storms, and conducive to local food security.
- **Accounting in Agriculture:** The Bank's goal of feeding every person, everywhere, every day while simultaneously combating climate change has far-reaching implications. True Cost accounting and lending policies would help the Bank match its rhetoric with positive loan outcomes.
- **Ecological Farming Approach:** By focusing on building strong, small-scale, agroecology programs (particularly among women farmers) country by country, the World Bank can best achieve its stated objectives of ending hunger, reducing financial poverty, improving food security, and addressing climate change. Countries with established farmer cooperative networks and extension programs should be targeted and identified for green development initatives, especially at a landscape level. South-to-South information exchanges can be funded to build farmer-to-farmer networks in countries where they are weakest.
- **Smart Bank Changes:** Fortunately, the WBG has begun to frame its agricultural loan policy and program in terms of the larger context of climate change, fighting poverty and feeding the increasing population. However, combining the three silos of agriculture, climate, and poverty does not fully constitute holistic thinking. All nine of the planetary life-support systems need to be taken sufficiently into account.
- **Third Party Certified Impacts & Related Risks:** Mandatory disclosure of ecological impacts as a part of bank loan risk analysis should be third party certified and show how proposed projects/loans would affect the nine boundaries. This would broaden and improve risk analysis.
- **Systems Approach to Economic Model:** A new holistic economic order is needed: one that is ecologically grounded in a decentralized, diversified production approach that reflects a True Cost Economy. For example, primary market focus will likely be much more sub-national, national, and continental. This will require an enormous shift in economic rules, supports, and investments. Such a new economic order is critical to saving life on earth, better ensuring broad human dignity, and protecting future generations.

PLANETARY BOUNDARIES: THE NECESSARY CONDITIONS FOR LIFE

The planet supports all life via the earth's natural systems. These systems are self-organizing and self-repairing within limits. However, when these limits are exceeded, the natural biophysical system starts to disintegrate making existence harder for the entire web of life and certainly us humans. In 2009, a group of 28 internationally renowned scientists identified a set of Planetary Boundaries within which humanity can continue to develop and thrive for generations to come alongside these natural systems. These boundaries were updated recently with added nuance. Scientists are clear on one reality: crossing certain boundaries will generate abrupt or irreversible biophysical changes and reduce the planet's ability to support life. (See Appendix, p. 23.)

These nine boundaries are as follows: freshwater use, land-system change, biosphere integrity (biological diversity), chemical dispersion, climate change, ocean acidification, biochemical flows (nitrogen and phosphorus cycles), stratospheric ozone depletion, novel entities (modified organisms), and atmospheric aerosol loading (air pollution).

We are now exceeding these boundaries and are on a trajectory towards devastating the Earth's ecosystems. Climate change is not a theoretical issue but rather a present reality. Superstorms, desertification, typhoons are an inescapable part of our lives. We must act now to avoid exacerbating the path that we are on and keep ourselves within a 2 degree world.

AGRICULTURE'S GLOBAL IMPACTS

One of the greatest pressures on the Planetary Boundaries comes from industrial agriculture. (See Appendix, p.23.) Mechanical- and chemical-intensive farming systems responsible for 25 to 30 percent of global greenhouse emissions[10] are exceeding the earth's finite boundaries. Soil erosion and aquifer depletion as well as chemical contamination are part and parcel of the industrial push to feed the world and expand the availability of meat, eggs and dairy products. Industrial farming methods promise a world of abundant cheap food but often burden local ecosystems and stress the planetary support systems. Of particular concern is the impact that these practices are having on water and soil.

Water. Due to unsustainable irrigation practices, the world is rapidly running out of fresh water. A 2015 study based on NASA satellite imagery reveals that more than half of the world's largest aquifers in locations from India and China to the United States and France are being tapped beyond sustainable replacement.[11] The ten-year study, conducted by scientists at the University of California Irvine, found that 21 of 37 major underground water reservoirs are beyond "sustainability tipping points" — a problem only likely to worsen as the world increasingly relies on aquifers for food production, mining and development. Water pollution due to chemical runoff is another critical problem. Alexander Müller at the Institute for Advanced Sustainability in Potsdam reports that of the 24 megatons of phosphorus fertilizers applied each year, less than 15 percent is actually absorbed by the plants.[12] The extra 21 megatons are tied up in the soil or can go fugitive in waterways and into oceans, contributing to over 400 oceanic dead zones.[13] Unaccounted for phosphorus runoff into water systems and the ocean degrades the ocean's ability to support life; a reality made clear by the Planetary Boundary analysis.

Soil. Industrial farming techniques also lead to the destruction of our soil systems, one of our most precious resources. Soil loss due to excessive plowing occurs in nearly all countries. Globally it is estimated that soil is being lost at between 10 and 40 times the natural rate of replenishment at an estimated cost of up to $500 billion per year.[14] Once it is lost, humanity's most valuable agricultural resource is gone forever. The loss of healthy topsoil has only been exacerbated by deforestation. When trees are cut down to expand farmlands, the land loses a natural windbreak, increasing exposure and soil loss. Root systems die when trees are cut, leaving little to hold the soil together and in place. The decrease in and eventual loss of fertile soil starts a dangerous

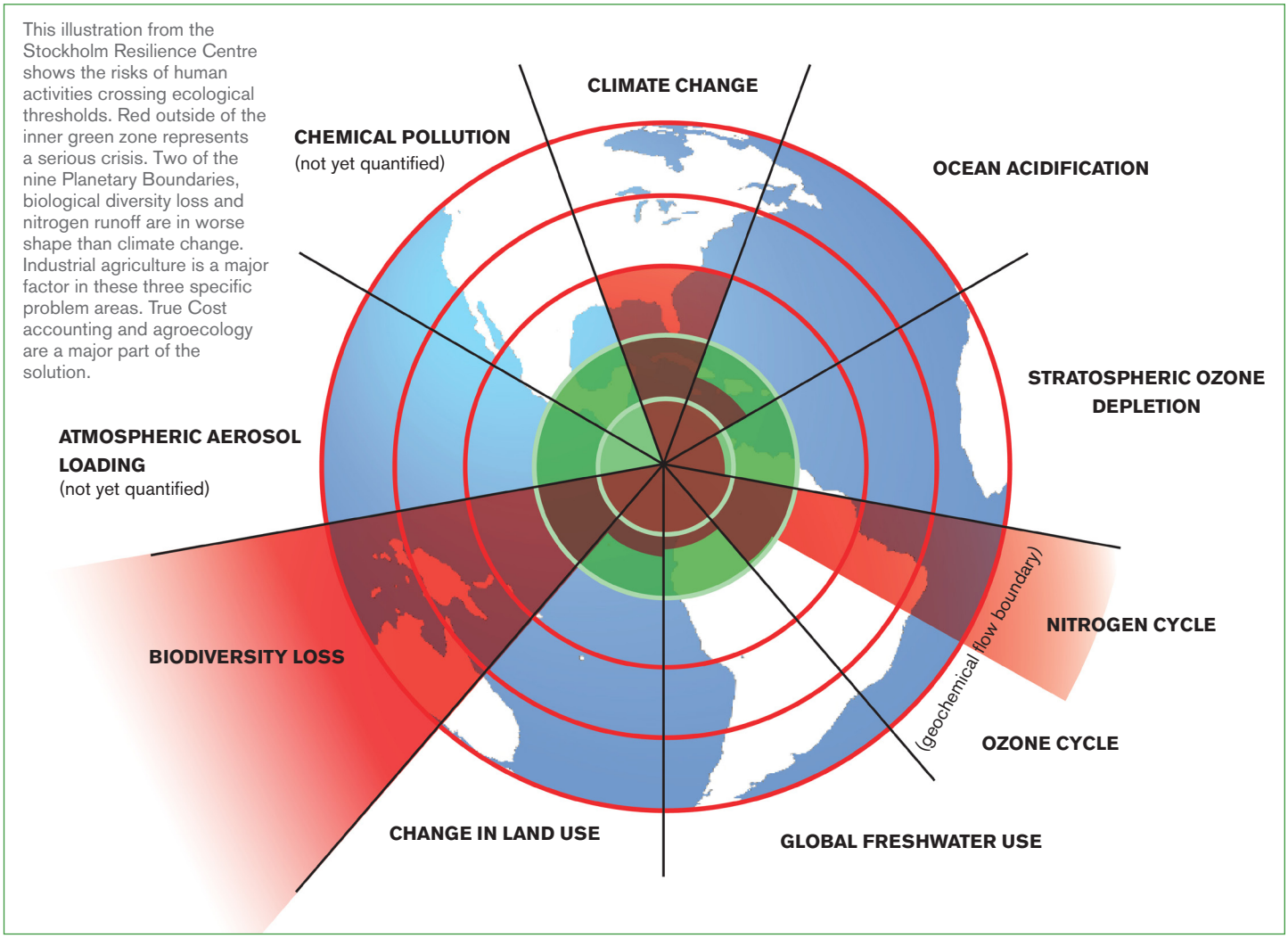
"The Bank's seal of approval on a project or even on a development approach can have widespread influence on the practices of other institutions around the globe."

- Bruce Rich, Foreclosing the Future[8]

cycle with old farmland being abandoned and new territory pushed into, compounding the destruction.

Public Health. On an anthropocentric level, industrial farming technologies bring public health burdens as well. Beyond the potential health damage that excessive and sustained exposure to pesticides can have on the farmers who handle them, the global diet has irrevocably changed. The world's 1 billion undernourished people[15] are now joined by nearly 2 billion people who are overweight.[16] A massive switch to grain, cereal, oil seed crops and animal proteins has caused a huge increase in high-calorie processed foods rich in salt, fats, and sugars. Many countries face a childhood obesity epidemic that could play out for decades without an abrupt revolution in the adoption of Nutritionally Smart foods.

Perverse Subsidies. However damaging to the planet or how costly to human health, industrialized farming systems have become embedded in our economic system. They have been consistently propped up by costly government subsidies, making it difficult to challenge. According to the Organization for Economic Cooperation and Development, agricultural subsidies from OECD countries along with Brazil, China, Indonesia, Kazakhstan, Russia, South Africa and Ukraine total $500 billion per year.[17] Many of these price supports and direct payments are trade distorting, further impoverishing small farmers and leading to land degradation.[18]



This illustration from the Stockholm Resilience Centre shows the risks of human activities crossing ecological thresholds. Red outside of the inner green zone represents a serious crisis. Two of the nine Planetary Boundaries, biological diversity loss and nitrogen runoff are in worse shape than climate change. Industrial agriculture is a major factor in these three specific problem areas. True Cost accounting and agroecology are a major part of the solution.

"As I see it, these pressures mean we haven't much choice in the matter. We are going to have to take some very brave steps."

Prince Charles, The Future of Food, Georgetown University, May 2011

WHAT AGRICULTURE MAKES THE WORLD MOST SECURE?

The realities of a quickly expanding and urbanizing global population are challenging societies to guarantee food security for all. As mentioned, the World Bank's food security definition embodies "access by all people at all times to enough food for an active, healthy life." When the UN FAO began tallying a global hunger index in 1969 there were roughly 800 million underfed people. By 2009 that number had risen to over 1 billion.[19] However, many of the world's poor go hungry not because farmers aren't producing enough healthy calories; people go hungry because surplus food never reaches those who desperately need it.

The UNFAO reports that 1.3 gigatons of food are wasted every year. In developing countries, this amounts to as much as 300 kilograms per person per year, including 100 kilograms of wasted food per capita at the consumer level.[20] The land related to that food-waste production spans 1.4 billion hectares, or 30 percent of the world's arable land. The associated CO2 emissions of production total 3.3 gigatons, slightly less than the CO2 emissions of the United States and China.[21]

Another factor exacerbating this lack of access to food is that nearly one-third of all agricultural production goes to livestock rather than directly feeding humans. A Livestock Revolution is sweeping the world with per capita meat, egg and dairy consumption expected to double by 2050[22]. While the nutritional value of animal protein is estimated to be 1.2 times as great as that of grains,[23] balancing the environmental and social costs of grain and livestock production with their nutritional benefits is a real challenge. Accepting the predicted rise in meat consumption that would accompany the forthcoming 9.6 billion people adopting the grain- and animal protein-intensive diet—regardless of whether it is appropriate or not—must inform any deep discussion about the best way to feed the world.[24]

The mass migration of people from rural to urban areas continues unabated. Infrastructure must be in place to provide low energy short supply chains bringing food from the countryside to the cities and giving people access to fresh food. The population of the lesser developed countries will be about 80% urban in a few decades. Most of the over-developed countries are already surpassing this figure. Food security in the future will require systems to feed the mega-cities. Urban farming can be a part of the solution, a movement that can help people to reconnect with many issues around food and nutrition. But urban farming will probably never meet the demands for food in cities of ten or twenty or more million people. An escalation in the development of regional rural-to-urban "food webs" therefore must be integral to planning discussions.

Given the rise in population and the inescapable reality of climate change, we must find a more successful way to tackle:

- **Food Security:** Increasing food productivity will be crucial but two key worries are that it could lead to greater deforestation and the clearing of yet more lands for cultivation. Boosting efficiency should not increase deforestation or expand the amount of land currently under production.
- **Climate Resilience:** Crops and farming methods need to be adapted to reflect realities of climate change. Global temperatures are on the rise and the effects of climate change are particularly apparent in agriculture. Even small changes can have significant repercussions affecting pests, rainfall, erosion, and seasons. For each degree of Celsius of global warming, for example, potential crop yields decline 5 percent or more.[25] The integration of deeply rooted perennial plants and natural habitats within farmlands can help protect crops lands from increased weather volatility and sequester long-lived carbon pools in the soil.
- **Climate Emissions:** The agricultural sector accounts for 25 to 30 percent of GHG emissions globally and is the largest source of non-carbon GHG emissions annually. [26]

AGROECOLOGY: AGRICULTURE FOR THE PRESENT AND FUTURE

How do we address the problems of food security and climate change within our food systems? Research increasingly points to a shift away from the industrial model and towards an agro-ecological approach.

The 2009 mega-study IAASTD "Agriculture at a Crossroads" report[27] (a World Bank supported project) consistently shows that, in the long term, small landholders can produce more food (and more kinds of food) with fewer resources, fewer pollution impacts, and lower transportation costs (a smaller carbon foot-

print) than industrial systems, while providing greater food security, maintaining greater biodiversity, and better withstanding the effects of climate change.

Economic analysis exposes inherent inefficiencies of mega-scale industrial farming. The concept of inverse size-productivity relationships reveals that the larger a farm becomes, the less efficient it becomes in terms of output.[28] Interpreting the data of University of Michigan professor Ivette Perfecto, it is arguable that because of inverse size-productivity relationships, the most efficient way to increase food production is to break up mega farms into smaller-scale operations. In many cases, it is perverse government subsidies to industrial agriculture that have enabled large-scale monoculture to become a dominant production model. Ending these subsidies and channeling government support toward agroecological and nutritionally intelligent solutions would go a long way to establishing a True Cost Economy allowing environmentally and socially beneficial production methods to compete more fairly.

Studies from all continents increasingly show that locally adapted, natural farming solutions that reduce chemical inputs and maximize diversity and yields can and must be scaled up. (See Appendix, p. 22.) Foundation Earth, Watershed Media and Millennium Institute partnered together to model the impacts of applying agroecological practices to a current World Bank loan. In 2014, the World Bank approved an $80million agricultural loan to Senegal primarily for irrigation infrastructure with an additional $6million of the Global Environment Facility. The study compared the proposed World Bank implementation plan that mainly focuses on the construction of irrigation infrastructure (to support industrial flower production for export to Europe) to a scenario in which the loan would support low-input small scale agroecology oriented farming with a strong training component. Findings indicate that the loan in the second scenario more successfully achieves the goals of increasing sustainable production, creating jobs, alleviating poverty, enhancing food security, while addressing climate change concerns and with far less pollution externalities.

When comparing the implementation of the project as originally designed to a shift to low-input small scale agroecology oriented farming (with training) one could say: Between now and 2050, the shift toward agroecology generates slightly more crop tonnage and agricultural employment, while achieving better results in these categories: GDP, agricultural production in monetary terms, crop value added, interest on foreign debt over government revenue, foreign debt over GDP, Human De-

Attributes of Agriculture of the Future

DECOUPLED FROM FOSSIL FUELS AND HARMFUL CHEMICALS

Replace fertilizer, pesticide and energy intensive agriculture with natural techniques like green manures, crop rotations, animal integration, polycultures, bio char, organics and integrated pest management

INCENTIVIZED STEWARDSHIP

Reward landowners for providing numerous public benefits of stewardship: crop production, soil enhancement, water filtration habitat protection, etc.

FOUNDATION OF LOCAL FOOD PRODUCTION

Transform agricultural regions into vital hubs of rural and urban jobs and food security within the limits of regional biological carrying capacity

DIVERSIFIED AND RESILIENT

Move from simplified and vulnerable monoculture to diversified and resilient agroecological systems

velopment Index, average life expectancy, rural poverty, overall poverty, cereal import dependency, prevalence of undernourishment, water stress index, soil organic matter, nitrogen soil nutrients, and overall soil fertility class. This supports the thesis of this paper that agroecology rather than industrial agriculture is better in the long term for people, jobs, and the planet. [For a copy of the study results contact Foundation Earth.]

Poverty reduction in the two scenarios is significant. According to the T21 model, the investment in irrigation infrastructure as currently proposed by the World Bank will lift 3,000 people out of poverty by 2050. Implementing the loan with a focus on low-input agroecology oriented farming and extensive farmer training, however, would allow more than 80,000 additional people to rise out of poverty. Based on this analysis, we recommend future loan implementation that is geared towards small producers and training on low external input techniques. An additional study is now underway to better compare industrial agriculture's ecological impact externalities with agroecology practices—specifically in the nine categories of the Planetary Boundaries scientific framework.

Growing a worldwide agroecology movement on a regional basis offers our best hope to build resilient and productive landscapes, improve soil and water quality, and prevent further conversions of forest and other habitats. This isn't just a simple matter of "organic" versus "conventional industrial" approaches. It's about identifying and then incentivizing the systems that employ the best solutions at local and landscape levels.

THE WORLD BANK, DEVELOPMENT AND AGRICULTURE

It is within these complex realities and this dire picture that the World Bank undertakes its agricultural lending program. The often stated purpose of the World Bank is to end poverty around the world through investing in projects in developing (less-industrialized) nations that help to grow their economies through the belief that growth in the nation's financial wealth benefits its citizens through shared prosperity. Agriculture is consequently a major (and increasing) focus of the World Bank since agriculture is the cornerstone of developing economies. Economic growth associated with loans in agriculture have proven to be two to four times more effective at alleviating poverty than growth from other sectors. In Africa, for example, every 10 percent increase in crop yields leads to an estimated 7 percent reduction in poverty.[29] Growth in neither the manufacturing nor service sectors produces such an equivalent benefit.[30] Finally, agricultural development is also viewed as a matter of global security, as the scarcity and rising cost of food become increasingly linked to political instability in a number of countries and regions.

Most of the food in the developing world is still produced on 500 million smallholder farms.[31] Improving conditions for farmers at the local level with resources to diversify farms and conserve resources provides a powerful opportunity for the World Bank to shape the lives of future generations. This type of agricultural development is frequently referred to as "Sustainable Intensification," describing the objective of boosting crop harvests on "underperforming" arable lands already engaged in food production. There is insufficient consensus, however, on how intensification can be maintained in an ecologically sustainable manner. Proposed approaches range from expanding the use of industrial technologies such as concentrated animal operations, herbicide-resistant genetically modified cereal crops, and precision chemical applications to investing in smallholder agriculture that optimizes local, naturally occurring resources.

Because of the mandate of the World Bank to address poverty, the moneys awarded must be carefully monitored to make sure that they benefit all sectors of society—especially the most needy. This tension between the economic investments of the World Bank and social and environmental outcomes continue to be problematic. Historically, the World Bank has tended to prioritize economic growth and privatization to the detriment of the societal and planetary good. It was this tension that led to the introduction of the World Bank Safeguards following the controversies that came to light in the 1980s over the Bank's legacy of environmental damage. The 1990s saw the introduction of environmental safeguards that aimed to "[provide] a framework for screening and analyzing proposed projects and identifying potential impacts that could trigger the application of the other more specialized policies."[32] The organization has continued to reform its code of conduct and practices. In 2015, the World Bank is once again reviewing them; a review that comes at a critical moment for the institution.

The geopolitical situation has shifted considerably since the World Bank's inception. US and western financial dominance is waning, especially since the 2008 crisis, while the BRICS countries (Brazil, Russia, India, China, and South Africa) have emerged. Even twenty years ago, countries like India and Brazil were not the powerhouse economies that they are today. Following their rise, the BRICS nations have established their own hugely capitalized development banks, instigating reform within the World Bank in an attempt to remain competitive since it is no longer the sole lender that states can turn to for support. Many

observers fear that intensifying competition from other development banks and private capital markets will result in the dismantling of hard-won environmental and social loan criteria. While the World Bank's financial role may be declining in value, the ideological direction set by the institution remains highly influential. According to author Bruce Rich, "the Bank's seal of approval on a project or even on a development approach can have widespread influence on the practices of other institutions around the globe."[33] Given its authority, the Bank should set a high standard for the financial world.

Bank leaders acknowledge that agriculture policies must be adapted if the World Bank hopes to reduce poverty, end hunger and mitigate planetary warming. At a public presentation on the "Future of Food" in Washington D.C. in April 2015, World Bank President Kim asked for "a rethinking of food from the ground up" in developing countries.[34] Consequently, while it seeks to profit from its loans, it is cognizant of a broader range of important related issues. In addition to basic repayment and profit, the agricultural loan program is focused on three core issues previously discussed: food security, climate resilience and reduced GHG emissions.

The World Bank Agricultural Action Plan (AAP) documents their vision of these tensions and offers a key intervention lever for Civil Society. The current AAP for FY2013-2015 is coming to an end with a new plan for FY2015-2017 to be approved late this year. The existing plan seeks to implement strategic investments that will help increase food production by 50% by 2050 while at the same time enhancing environmental services and sustainability and distributes $8 billion to $10 billion annually to the sector.[35]

World Bank and Climate-Smart Agriculture?

To improve agricultural productivity while strengthening resilience to weather extremes and decreasing greenhouse gas emissions the World Bank has embraced a policy of Climate-Smart Agriculture (CSA). New loan applications now require estimates on emissions, productivity, and adaptation. The ultimate goal is for 100 percent of World Bank-funded agriculture projects to be climate-smart by 2018.[36]

Climate-Smart Agriculture originated at the United Nations Food and Agricultural Organization (FAO) to address the intertwining challenges of increasing food demands and global warming. Linked to emerging multi-billion dollar carbon markets, the concept quickly ascended to the boardrooms of multinational corporations as well as international policy circles. With so much potential investment money on the table, CSA now risks becoming more of a catch phrase to justify the expansion of industrial agriculture rather than a scientifically informed lending strategy aimed at truly innovative solutions. The World Bank's Climate-Smart Agriculture (CSA) policy presently leans more toward monoculture intensification (palm plantations, biofuels, concentrated animal operations, etc.) than diversified agroecology solutions. It also reflects the position of the Global Alliance for Climate-Smart Agriculture (GACSA), a group that the World Bank joined in 2014.

The Global Alliance for Climate-Smart Agriculture (GACSA) was established in 2014 as an independent self-governing alliance to "address the challenges facing food security and agriculture by tapping the wealth and diversity of resources, knowledge, information and expertise, from and between its members, in order

Industrial Agriculture Systems	Agroecological Approach
Single crop monocultures, intensive livestock and plantation operations	Diversification of species and varieties of plants and animals within the farm
Heavy reliance on external inputs and industrial technologies such as synthetic fertilizers and pesticides, patented seeds, faraway feed sources, as well as antibiotics and growth enhancers in animal systems to maximize production	Harness natural processes such as nutrient cycling, biological nitrogen fixation, allelopathy, predation and parasitism to build fertility, combat pests, and maximize yields; livestock production based around locally adapted breeds, pastures and tree intercropping (silvopastoral approach)
Simplified landscape model highly vulnerable to extreme weather events, pest and disease outbreaks, weed resistance	Complex land use that builds in resilience to weather extremes, pest, weed and disease pressures with a matrix of natural habitat, deep rooted perennials and other diverse plantings
Capital intensive corporate ownership model	Highly adaptable at smallholder or even at a large-scale level

to stimulate concrete initiatives."[37] But while the original UN FAO definition of Climate Smart Agriculture headed toward smallholder agroecological solutions, the GACSA's organizational structure may be unable to resist powerful multinational agriculture influences attempting to tap new finance methods to expand industrial production. Under the GASCA framework, for example, deforestation for palm oil, sugar cane and soy monocultures, increased synthetic fertilizer use, intensive livestock operations and other large-scale industrial approaches all can currently be considered. Critical environmental and social safeguards are presently lacking.

Climate-Smart Infrastructure?

In addition to CSA, the World Bank's agricultural plan supports strengthening food sector value chains by connecting farmers to markets (through infrastructure and trade facilitation), and linking deficit regions with surplus regions to reduce price volatility. Infrastructure projects related to the agricultural sector such as railways, deep water ports and roads that deliver goods to market are often advertised as the best path to poverty alleviation. Such large-scale efforts within the sector have led to the World Bank's emphasis on "enabling" governments to open up rural regions and river systems to direct foreign investment in monoculture, chemical-intensive, export-based farming, which often concentrate more wealth at the top. Of further concern, the World Bank has joined in a new global consensus at a higher geo-political level (the G20 largest economies) to pump tens of trillions of dollars (over 15 years) into large infrastructure "development."

The economic projections for mega infrastructure investments rarely include the true costs—highly destructive impacts on the natural environment and human communities. Land grabs, forced evictions, human rights violations, water pollution and aquifer depletion are oft-heard criticisms of this recent development strategy and are directly related to agriculture. Supporting a new "agroecological infrastructure" that balances the natural limitations of local ecosystems, along with supporting regional farmer-to-farmer knowledge exchanges, is an essential goal for creating long-term solutions to food insecurity and climate instability. Big dams for industrial agriculture do not qualify as climate-smart.

Innovative programs intended to tackle the climate challenge are already underway. In 2015, France's Ministry of Agriculture, Agrifood and Forestry highlighted "4 for 1000" initiative. The aim is to adopt and advance practices such as cover cropping, reforestation, energy conservation, and chemical reduction that increase organic matter and store carbon in the country's soils by 4 per thousand (0.4 percent) per year. The creation of long lived carbon pools in the soil could effectively compensate for the greenhouse gases emitted due to human behavior.

Seven Principles of Responsible Agricultural Investments (PRAI)

UNCTAD, FAO, IFAD and the World Bank have jointly developed a set of Principles for responsible agricultural investment that respect rights, livelihoods and resources (PRAI).
The principles are:

1. **Existing rights to land and associated natural resources are recognized and respected.**
2. **Investments do not jeopardize food security but rather strengthen it.**
3. **Processes for accessing land and other resources, and making associated investments, are transparent, monitored, and ensure accountability by all stakeholders, within a proper business, legal, and regulatory environment.**
4. **All those materially affected are consulted, and agreements from consultations are recorded and enforced.**
5. **Investors ensure that projects respect the rule of law, reflect industry best practice, are viable economically, and result in durable shared value.**
6. **Investments generate desirable social and distributional impacts and do not increase vulnerability.**
7. **Environmental impacts due to a project are quantified and measures taken to encourage sustainable resource use while minimizing the risk/magnitude of negative impacts and mitigating them.[38]**

"A project may have domestic, cross-border, or global externalities. A large portion of such externalities are environmental. The economic evaluation of Bank-financed projects takes into account any domestic and cross-border externalities."

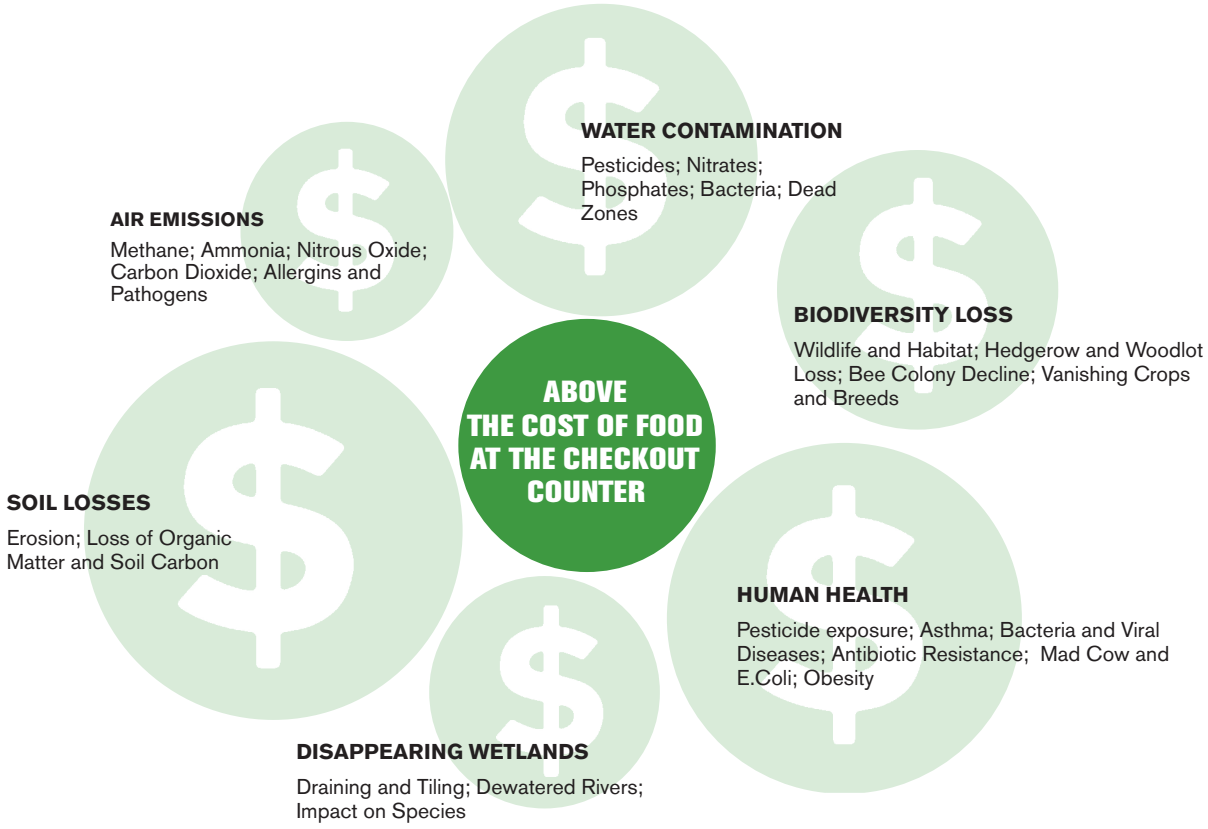
— World Bank Operational Procedure (OP) 10.04 written in 1994 [39]

WHY A NEW AGRICULTURAL ACCOUNTING SYSTEM IS NEEDED?

The rewriting of the World Bank's Agriculture Action Plan for FY2015-17 offers a tremendous opportunity to shift billions of dollars towards sustainable farming based on agroecological practices. The current bank loan and finance system fosters an accounting approach that destroys the ultimate ability to repay a loan, locking nations into a dependency on MDBs and corporations. A dramatic shift is needed in application procedures and finance strategies to allow smallholders to compete with heavily subsidized and externality-dependent industrial agriculture. The World Bank could use the opportunity of updating the Agricultural Action Plan to turn that document into an "Agroecology Action Lending Plan" that promotes a more complete understanding of CSA that we have termed "Biosphere Smart Agriculture." Collectively, these two new policies could focus quite specifically on the kind of long-term holistic thinking that creates ecological conditions for healthy outcomes in order to curb the damage to the planet.

A SYSTEMS THINKING APPROACH

In light of the interconnectedness of biological indicators that the Planetary Boundaries highlight, we must reassess our approach on problem-solving and adopt a more systems thinking orientation. Ecology by definition is the study of systems and not the study of individual components. All life forms and all agriculture are embedded within local ecological systems, which are embedded within the earth systems of the biosphere. A holistic (or general systems) thinking approach to tackling the problems of food security and climate change first considers these embedded systems by analyzing a task in terms of key relationships, contexts, patterns, and processes. Silo thinking does the opposite. It considers only that task isolated from consequences and the interconnectedness of the natural system. Fortunately, the WBG has begun to frame its agricultural loan policy and program in broader terms. They include: 1) loan payback; 2) the larger context of climate change; 3) fighting poverty; and 4) feeding an ever-increasing population. Howev-



er, even combining the silos of agriculture, climate, and poverty does not necessarily constitute true holistic thinking. A review of the planetary life-support systems could help us construct a True Cost loan process for agricultural projects.

WHAT ARE TRUE COST LOANS?

The World Bank Operational Procedures were written in 1994 to address the environmental crisis of climate change. (See Appendix, p. 21.) However, if 1994 was the 10th hour, we have now reached the 11th hour. We must make the above 1994 commitment real for the World Bank and all bank-financed projects globally. A True Cost agricultural loan employs methods requiring lenders to take pollution externalities (ecological impacts) into account at the beginning stages of funding decisions and pushes them to choose the most environmentally appropriate options.

A True Cost loan considers embedded systems, comparing project externalities against the Planetary Boundary scientific framework. Done right, a True Cost agricultural loan results in an investment in the healthiest food possible grown in the healthiest environment possible for as many people as possible. True Cost loans are designed to set positive long-term trends in motion. By investing in healthy food systems and environmental outcomes from the outset, other unintended costs will be avoided or minimized in the future. These savings and investments can foster improvements in economic vibrancy, but more importantly, prevent us from a future that is insecure and shaken by the impacts of climate unpredictability and the dangers derived from desperation and inequality. A True Cost agricultural loan effectively rejects highly polluting and soil destroying agriculture in favor of diversified and place-specific agroecology approaches.

THE LOAN APPLICATION PROCESS

Loan applications need to be designed so that they show any and all pollution externalities. When not required to detail the externalities explicitly, financial institutions can and have been avoiding responsibility for the ecological damage resulting from irresponsible lending. This allows them to fund projects where the external costs/damage from certain agriculture activities (large grain and cereal operations, for example) actually exceed the value of crops produced. Once detailed, pollution externality categories would be compared to the regional, continental, and global limits. For example, with problems such as nitrogen fertilizer runoff into specific aquatic dead zones, caps could be set for each region with a provision that no loans could be made over the cap in that category.

This would help solve the problem when a country puts forward a loan proposal for a designated project, such as an industrial soybean monoculture operation or palm oil plantation or industrial hog facility. In this case the loan officer typically has to decide whether to approve the loan application and move it along or not. It is difficult to challenge the very basis of the application and the ecological sustainability of an entire project, so officers will often work to make the proposed project as environmentally responsible as possible within the stated parameters rather

Theory of Change for True Cost Agriculture

TRUE COST FINANCING

Upstream financial responsibilities and accountability for the financial sector

BOLD RESEARCH AGENDA

New research on carbon positive farming, locally adapted plant varieties and animal breeds, and ecologially sustainable land management

SUBSIDY SHIFTING

Move to a green payments (pro-soil and pro-conservation) and food security (pro-poor) and away from agribusiness commodities

SOCIAL MOVEMENT

Partnerships: farmer to farmer; urban and rural; public health and environment; producers and consumers

than rejecting it out of hand. The magnitude of the planetary crises at hand demand more than minor tweaks to existing policies.

A reframing of the World Bank's agriculture program based on systems thinking would allow for different kinds of projects to be proposed and approved—projects that begin with a sustainable vision from the outset. A more holistic evaluation approach would better equip the World Bank to project the ecological externalities of all agricultural loan applications. For instance, a $100 million loan application for industrial high-input soybean production would require an estimate of the impacts of inputs that could potentially overload the biosphere with chemicals. It would analyze the ecological and economic implications of genetically modified and patented seeds that are dependent upon synthetic fertilizers and pesticides to maintain yields, at costs that could trap smallholder farmers in cycles of debt rather than raise them out of poverty. It would highlight whether most of that soy would become cattle feed or biofuel or food, and any respective contributions to climate change. Water use and soil quality projections are also critical, especially as insects and weeds become resistant to pesticides, and more intensive chemical applications are ultimately needed to sustain yields. One begins to see a more complete picture of the pollution impacts the loan sets in motion when the application process is properly designed. (See Appendix.)

LOAN-OFFICER INCENTIVE SYSTEMS & MOVING MONEY

Regardless of the more positive recent rhetoric of World Bank leadership, the old-fashioned attitude of "Get big loans out the door fast and you will get recognized and promoted" remains the modus operandi of World Bank loan officers. (See Appendix.) Such an outdated incentive system should be replaced with incentives that aim to holistically solve the fundamental problems that the planet is now facing. As former World Bank Presidents have come to realize, top-down management policies can only go so far when trying to change the direction of investment to more ecologically sound practices. As any good manager knows, it is essential to focus on the ground level when making organizational changes. Staff must be involved at every step and included in the process in order for policies to be successfully adopted. Consequently, at the World Bank, loan officers must understand the need for and participate in these Biosphere Smart reforms if they are to succeed. Loan officers must come to understand the critical point that the planet has reached and be given impetus to adapt. For this ecological approach to lending to be achieved, officers must first be trained in the holistic systems approach and the Planetary Boundaries and subsequently be rewarded for applying such long-term ecological thinking to their funding choices.

To achieve these reforms, a restructuring of the loan officer's incentives at the World Bank is necessary and must be part of any update of the AAP. In summary, these reforms should include:

- **A mandatory educational program for loan officers that informs them of the ecological impacts that projects could have on the Planetary Boundaries.**
- **Annual summaries of the Planetary Boundaries highlighting problematic areas delivered to all loan officers to keep them up-to-date. For example, this might show several watersheds on a continent where ocean dead zones (from fertilizer runoff) have been created or where they are in formation.**
- **Earmarked funding for civil society engagement and Planetary Boundaries Assessment for every project prior to loan approval.**
- **More stringent guidelines for loan officers to foster civil society and thorough community engagement (effected communities, farmers, fisherfolks, etc.) prior to loan application and approval.**
- **Precise Planetary Boundary-specific indicators within the WB standardized Core Sector Indicators that are used to monitor and evaluate projects.**
- **Planetary Boundary No-Go Zones: Clear, stringent guidelines for loan officers showing which problematic boundaries require that additional impacts (i.e. nutrient load, deforestation, land clearing) would exacerbate that problem and simply cannot be approved.**
- **Evaluation of the WB loan officer's level and understanding of Planet Boundaries impact assessment built into annual staff assessment and promotion decisions.**
- **Agricultural loan program summaries that show the quantity (in aggregate and by individual loan) of annual Planetary Boundary impacts attributed to the loans.**
- **Agricultural sector loans (not project specific and hence lacking pollution externality data on runoffs, etc.) would be assigned estimates typical to high-impact industrial agriculture. These would be used for comparison to project specific loans. Anecdotal evidence of how sector lending was spent over the last two or three years could also be utilized in program and employee reviews.**

IN-COUNTRY PROJECT PROPOSALS

Since the moving of money begins with a country putting forward its loan proposal for a project, choosing agricultural projects with ecological integrity needs to start with the right thinking in the recipient countries. Consequently, any reform to the loan application must be accompanied by on-the-ground training programs relative to the recipient countries' effects on the Planetary Boundaries. Ecologically sensible agricultural loan requests would then emerge at the front end of the process.

Another method by which smallholder agroecological projects from a given biological region can be supported by the World Bank would be through loans to cooperatives. By banding together multiple smallholders, the funds could be given to the government and dispersed to the lead entity and then distributed amongst the members. Research has shown that, when implemented correctly, smallholder agricultural cooperatives can provide food security, sustainable yields and poverty reduction. International Food Policy Research Institute found that participation in the IFAD and FAO backed Farmer Field Schools (a farmer organization in Kenya, Uganda and Tanzania) resulted in a 61% increase in agricultural incomes in all three countries and an impressive 100% increase in Tanzania. Moreover, participation also led to an 80% increase in crop productivity in Kenya and an 187% increase in livestock production in Uganda.[40] The success of these types of cooperatives is not limited to local markets. Oxfam's campaign, "Think Big. Go Small"[41] showed that through effective planning smallholders can be brought together to successfully provide goods to the wider international market, promoting a policy of 'inclusive procurement'. As an example of the scale achievable by such an approach, Oxfam cited the predominantly smallholder Fairtrade movement, which now achieves annual retail sales of 2.9 billion Euros globally.

Ecologically sensible agricultural loan requests would then emerge at the front end of the process. This type of ecological thinking by governments who go beyond the minimum and provide more detailed assessments of pollution externalities could be further rewarded and encouraged by the World Bank by rewarding them with grants, more favorable loan terms, or technical assistance.

The World Bank has already successfully used this type of grouped funding with cooperatives of smallholder farmers in countries such as Costa Rica. Costa Rica's agricultural co-op movement receives money through a government agency (the National Fund for Forestry Financing) that then pays smallholder farmers in the Coopeagri cooperative for tree cultivation. Numerous countries have a similar capacity or potential to institute such programs through assistance and training.
To better foster food security in countries and regions around the world, the World Bank should:

- **Shift the vast majority of agricultural funding to support agroecological practices;**
- **Make more loans of smaller amounts to a wider number of projects and endure the slightly higher transaction costs and;**
- **When necessary to make large loans, do so through intermediaries, such as in the Costa Rican co-op example;**
- **Utilize GEF grants (not loans) to build co-op capacity building and farmer-to-farmer networks where needed such as in Honduras;**
- **Support South-to-South exchanges to increase regional food resilience by connecting local community leaders and farmers utilizing agroecological techniques. Sri Lanka and Costa Rica are already exploring such a collaboration;**
- **Reward applicant governments who exhibit a more meaningful assessment of environmental and social impacts with more favorable loan terms or technical assistance;**
- **Take a multi-stakeholder approach to large investments to ensure that all effected communities are engaged, with negative feedback and positive synergies taken into account.**

FIXING A PROBLEMATIC ECONOMIC MODEL TO SUPPORT PLANETARY LIFE

A serious, concerted effort to reorient our economic models rapidly away from resource depleting and ecosystem shredding activities is required. We cannot continue to overshoot the Planetary Boundaries by overdrafting aquifers, polluting air and water, and destroying soil and habitat. The better path would be smaller-scale, ecologically smarter and more flexible agricultural systems designed to be maintained without damaging the Earth's ecosystems. Biosphere Smart Agriculture in a True Cost Economy is the systems based approach that can help achieve that goal.

While many accomplishments have been made in raising living standards and advancing technologies through industrial agriculture, they have also come at a great price to the health of the planet. Many such accomplishments are not sustainable for another century; let alone for the next few thousand years. If in the coming years, the Earth's temperature rises by four degrees Celsius, industrial agriculture will largely fail as will many of global food delivery systems with wheat and maize losses potentially exceeding 50 percent.[42] Such a failure will be an incalculable tragedy for millions if not billions of people and much of the web of life.

To be clear about the need for fundamental changes in the World Bank's agricultural approach we note these three final summary points:

Carrying Capacity Limit & Risk Analysis: The economy needs institutions with the power to analyze the problem and ratchet down or shift economic activity, especially loans. The Planetary Boundary analysis, though new, is an important tool to assess limits and risks. Mandatory disclosure of ecological impacts (as a part of risk analysis) that are third party certified and show how they affect the nine boundaries would advance this goal. Bank loan officers and managers all the way to the World Bank President need to be trained, empowered, and incentivized to help stop the wrong kinds of agriculture loans.

A True Cost Economy: Subsidies distort markets by hiding risk. Pollution is a subsidy. Full cost accounting exposes ecological impacts (externalities). The elimination of ecologically perverse subsidies to the oil and gas sector by the IMF and G20 would be consistent with the True Cost accounting spirit of this paper. If such perverse subsides were brought to an end, renewable energy would already be cheaper than fossil fuel or nuclear powered energy. Ecological farming would be more profitable for the small farmers.

Green Infrastructure Only: In this critical moment, the global financial powers including the World Bank are laying the plans for a massive investment in agricultural infrastructure in order to spur the global economy meet the coming demands. Business-as-usual with export-driven monoculture models will most likely cause human civilization to further exceed the Earth's carrying capacity and threaten life support systems to further decline and eventually collapse. Further developing infrastructure via the WB's Global Infrastructure Facility in support of this failing economic model is doubling down on a dangerous vision. Worse still, based on Oxford University Business Profesor Bent Flyvbjerg's research, only 1 in 1000 infrastructure projects are delivered on time and on budget and provide the desired benefits.[43] We must not lock in problematic technologies and debt burdens for generations to come. All infrastructure should be green and agroecologically oriented.

In conclusion, the WBG must ask the most important question of its developing Climate Smart Agriculture policy. Will it help to reverse critical warming or further damage the Earth's life support systems? There will be no vibrant industry or coveted economic growth model on an exhausted planet. If corporate executives and finance ministers continue to drive this agenda with a flawed ideology, our future may be doomed to rapid ecological deterioration with limited chance for recovery.

We propose a Biosphere Smart Agriculture in a True Cost Economy. The objective is to:

- **Foster the economic model changes listed above;**
- **Educate key people about ecologically sustainable agriculture in the context of the biosphere's nine Planetary Boundaries;**
- **Provide incentives and tools for the above (see Appendix for a list of tools);**
- **Stop funding agriculture projects that further exacerbate the already overstressed Planetary Boundary system;**
- **Fund soil building hand in hand with agroecology and green infrastructure.**

As the standard bearer for banks globally, the World Bank Preseident and team should adopt lending practices that reduce ecological impact externalities and respect the planet's life support systems. This critical shift will help foster an essential overarching goal: food that is ecologically grown, fair, and healthy. Current and future generations will be appreciative. The planetary web of life will experience a breath of fresh air.

ENDNOTES

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APPENDIX

1. ABBREVIATIONS

AAP – Agricultural Action Plan
BRICS – Brazil, Russia, India, China, and South Africa
CSA – Climate Smart Agriculture
FAO – Food and Agriculture Organization
FRC – Feed conversion ratio
G20 – Group of 20 largest economies
GEF – Global Environment Facility
GIF – Global Infrastructure Facility
GHG – Greenhouse Gas
GACSA – Global Alliance for Climate Smart Agriculture
IBRD – International Bank for Reconstruction and Development
IDA – International Development Association
IFC – International Finance Corporation
IMF – International Monetary Fund
MDB – Multilateral Development Bank
MIGA – Multilateral Investment Guarantee Agency
OECD – Organization for Economic Cooperation and Development
OP – Operational Policy (at the World Bank)
PRAI – Principles of Responsible Agricultural Investments
SDG – Sustainable Development Goals
WB – World Bank
WBG – World Bank Group

2. FIXING THE FAILURE OF WORLD BANK'S OPERATIONAL PROCEDURE 10.04

The World Bank's Operational Policies are broken down into 14 categories, each with a specific focus. OP10 addresses Investment Project Financing. Within OP10, OP10.04 addresses the Economic Evaluation of Investment Operations and was written in 1994. The quite sensible and important focus of OP10.04 is the analysis done by loan officers when considering whether to approve or decline loan applications. Operational Procedure 10.04 made important statements about ecological impact externalities. The point of OP10.04 was to call for analysis to be done by loan officers when considering whether to approve or decline loan applications. This hasn't happened. While twenty plus years have passed, this important procedure still needs to be properly implemented. Section 8 reads as follows:

> **EXTERNALITIES**
> 8. A project may have domestic, cross-border, or global externalities. A large proportion of such externalities are environmental. The economic evaluation of Bank-financed projects takes into account any domestic and cross-border externalities. A project's global externalities--normally identified in the Bank's sector work or in the environmental assessment process--are considered in the economic analysis when (a) payments related to the project are made under an international agreement, or (b) projects or project components are financed by the Global Environment Facility. Otherwise, global externalities are fully assessed (to the extent tools are available) as part of the environment assessment process and taken into account in project design and selection.

The Operational Procedure covers these headings: Criterion for Acceptability, Alternatives, Nonmonetary Benefits, Sustainability (not about ecological sustainability), Risk, Poverty, and Externalities.

OP10.04 is based on three points. The first addresses the manner by which decisions to approve loans are reached. Currently Cost-Benefit Analysis (CBA) is performed to measure how productive the money would be if approved. This CBA produces a Net Present Value (NPV). The aim of loan officers is to help countries select the program with the highest NPV. Officers would deny the loan if the NPV is negative because a negative NPV means that either the developing country is becoming poorer or the loan is inefficient and resources are being wasted.

The second point is to establish the scope of CBA. The Operational Procedure allows for the approval of loans that do not have the highest NPV because their benefits cannot be measured in monetary terms.

The third point encourages officers to consider what constitutes a "good" CBA. It is this third pillar that has the greatest flexibility and scope for reform. "Good" CBA currently requires (among other stipulations) the consideration of the following prior to loan approval;

- alternative strategies (Clause 3)
- sustainability in terms of economic, institutional, and environmental factors (Clause 5)
- the associated risks (Clause 6)
- the domestic and international externalities (Clause 8)

FIXING THE PROBLEM

When discussing the section in its July 2011 meeting, the Committee of Development Effectiveness (CODE) raised concern over OP10.04. The first issue was over the lack of compliance and accountability by country clients. The second issue was the need to move away from the outdated traditional model of CBA

and towards a new consolidated framework with an expanded toolkit. This new framework will need to be taught to the loan officers so that they understand the new system and can better advise the country clients.

This paper addressees the ecological impacts typically left out of the banker's calculations. There is a table of additional tools in this Appendix, many of which were developed after 1994. Two decades have been lost and numerous World Bank presidents and senior agricultural loan staff have not been held accountable. The problem still needs to be fixed.

The full-text of OP10.04 is available at; http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTOPMANUAL/0,,contentMDK:20064625~menuPK:4564185~pagePK:64709096~piPK:64709108~theSitePK:502184,00.html

3. CASE STUDIES OF THE SUCCESSFUL IMPLEMENTATION OF AGROECOLOGICAL PRACTICES

CUBA

Cuba's island agriculture is a complex matrix of large-scale industrial, biotech crops, and agroecological farming systems. When Soviet support for industrial agriculture ended in the early 1990s, the country underwent a forced transition to organic farming. The following 20 years have served as a case study in the potential of diversified smallholder production. According to authors Miguel Altieri and Fernando Funes-Monazite, smallholder agriculture in Cuba is both self-sustaining and resilient. "If all the peasant farms (controlling 25 percent of land) and all the UBPC ('Unidad Básica de Producción Cooperativa', which controls 42 percent of farmland) adopted diversified agroecological designs, Cuba would be able to produce enough to feed its population, supply food to the tourist industry, and even export some food to help generate foreign currency. All this production would be supplemented with urban agriculture, which is already reaching significant levels of production." Studies also show that smallholder agriculture is resilient to extreme climate events. 40 days after Hurricane Ike devastated Cuba in 2008, researchers conducted a farm survey in the provinces of Holguin and Las Tunas. Diversified farms exhibited losses of 50 percent compared to 90 to 100 percent in neighboring farms growing monocultures. Likewise agroecologically managed farms showed a faster productive recovery (80 to 90 percent forty days after the hurricane) than nearby monoculture operations.

Miguel A. Altieri and Fernando R. Funes-Monzote, "The Paradox of Cuban Agriculture," *Monthly Review*, January 2012, Online version, http://monthlyreview.org/2012/01/01/the-paradox-of-cuban-agriculture/

CAMBODIA

The System of Rice Intensification (SRI) aims to increase rice yields while managing the surrounding ecosystem. CEDAC implemented a trial of these practices in Cambodia, where 65 percent of the population rely on rice farming as their source of food and income. Before the SRI implementation, Cambodians were growing enough rice to maintain their food supply but with barely enough extra to sell in markets. Consequently, it was very hard to turn a profit. SRI principles differ from regular rice farming, which caused many to initially be skeptical about its performance. SRI calls for better consideration of soil nutrients and improved sustainable production techniques including better seed selection, more organic fertilizer, less seed density and earlier transplantation. In Cambodia, the implementation of SRI saw huge benefits. Though some farmers are stuck in their old ways, those who began practicing SRI principles saw enormous increases in overall production, 3.82 million tons in 2002 to 7.97 million in 2009-10, while also producing less emissions and using less environmentally harmful practices. Due to SRI principles, not only do the Cambodian people have enough rice to support their families, but the government also now believes that they are on track for a production scale that can lead to rice as an export commodity for the state. Some factors that still need work; weeding, water management, cultural support, etc. but the potential is there.

Institute for Agriculture and Trade Policy, and Asian Farmers' Association for Sustainable Rural Development. "Agroecology and Advocacy: Innovations in Asia." IATP. Institute for Agriculture and Trade Policy, Oct. 2011. Web. 17 June 2015. http://www.iatp.org/files/2011_10_14_Agroecology_Advocacy.pdf

KENYA

The cool climate in the Kericho region of Kenya has proved to be ideal for growing tea. However, climate change has been threatening the region through increased temperatures, and a lack of eucalyptus, which is needed for tea processing. The rapid deforestation of the Mau forests that outline the tea landscape has caused a significnt loss of biodiversity and has destroyed the protection that the trees historically provided to the watershed, damaging water supplies for the region. With the help of the Rainforest Alliance (RA), the Kericho area has been implementing agroecological techniques in order to save the tea region, which could be wiped out by 2050 if no action is taken. RA helps tea plantations and processing facilities achieve a set of social and environmental benchmarks necessary to receive RA certification. This certification, in turn, can increase the marketability and profitability of tea since many name brands are starting to only accept teas from certified growers. Techniques that have been implemented are: agroforestry, targeted use of fertilizers based on regular nutrient analyses, Integrated Pest Management practices, infilling to reduce erosion risk, tea plucking at

more frequent intervals, protection of riparian buffers, protection of forest reserves on farms, particularly adjacent to the Mau forest and construction of lagoons and wetlands for water conservation and water quality. Though these practices have been beneficial, there is still work needed to build agroecological training and support among smallholders and to address fuelwood energy needs and associated deforestation.

Milder, J. C., Moroge, M., & Shames, S. (2015). Operationalizing climate-smart agricultural landscapes: the case of a tea-producing landscape in Kericho, Kenya. In Minang, P. A., van Noordwijk, M., Freeman, O. E., Mbow, C., de Leeuw, J., & Catacutan, D. (Eds.) *Climate-Smart Landscapes: Multifunctionality in Practice*, 319-333. Nairobi, Kenya: World Agroforestry Centre (ICRAF).

4. INVESTMENTS & THE NINE PLANETARY BOUNDARIES

BASIC CONDITIONS FOR LIFE

The planet supports all life via the earth's natural systems. These systems are self-organizing and self-repairing within limits. When these limits are exceeded, the natural biophysical system starts to disintegrate making existence harder for the entire web of life and certainly us humans. In 2009, a group of 28 internationally renowned scientists identified a set of Planetary Boundaries within which humanity can continue to develop and thrive for generations to come alongside these natural systems. Scientists are clear on one reality: crossing certain boundaries will generate abrupt or irreversible biophysical changes and reduce the planet's ability to support life. We have no definitive idea how many important dimensions there are to the global life-support system. While imperfect, this framework is important and helpful. These nine boundaries are as follows: freshwater use, land-system change, biosphere integrity (diversity), chemical dispersion, climate change, ocean acidification, biochemical flows (nitrogen and phosphorus cycles), stratospheric ozone depletion, novel entities (modified organisms), and atmospheric aerosol loading (air pollution). All the boundaries are closely linked. Scientists have techniques to quantify the health of most of the boundaries, while others require more research. It is an important indicator and feedback system to ensure a healthy planet and hence a healthy human context.

SMART BANKERS & INVESTORS

Smart bankers and investors need to have their investments respect these boundaries and help maintain global ecological stability and livability. This is a key to all economic stability. To achieve this, bankers and investors need loan seekers to disclose ecological impacts or potential impacts to the planetary systems. Bankers and investors also need internal analysis of the data and adjustments to the economic activities they want to fund. The nine Planetary Boundaries are:

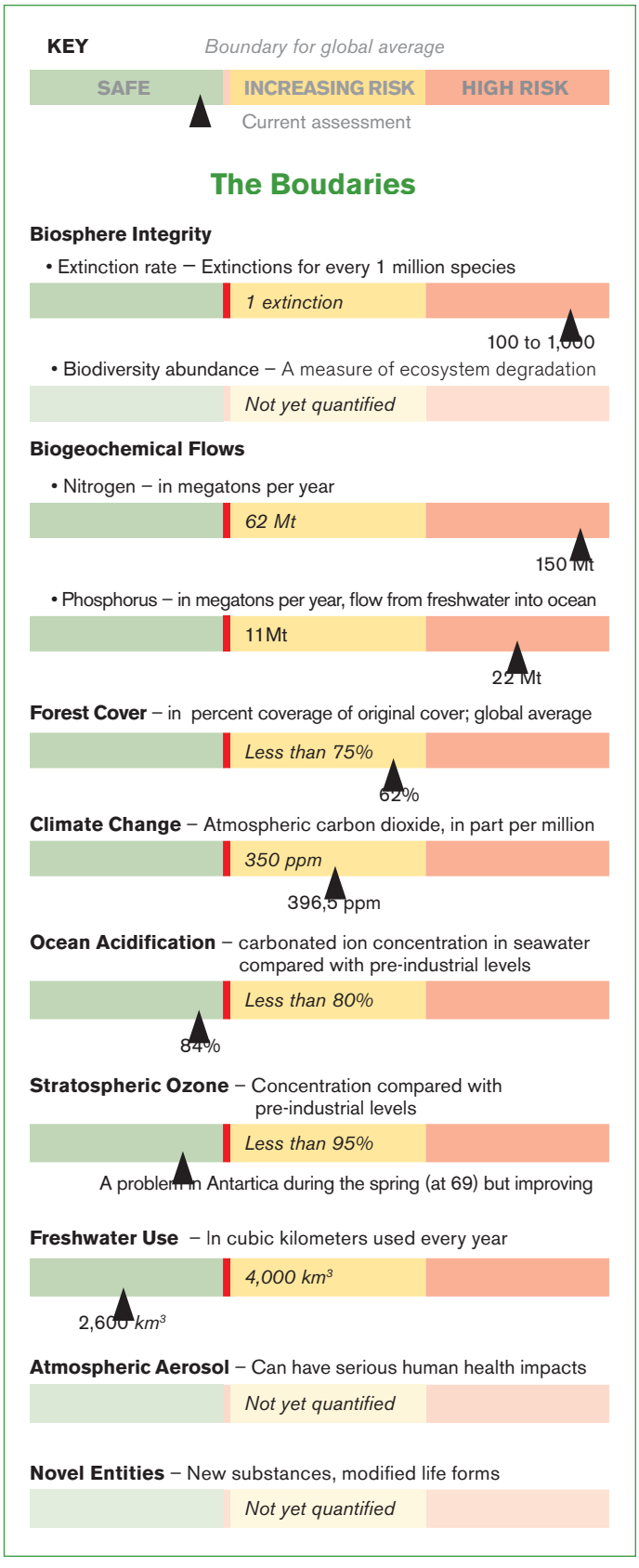
1. **Stratospheric Ozone Depletion:** The stratospheric ozone layer in the atmosphere filters out ultraviolet (UV) radiation from the sun. If this barrier thins, ultraviolet radiation will reach the ground and damage terrestrial and aquatic ecosystems, causing increased occurrences of skin cancer in humans. The reduction of the Antarctic ozone hole was proof that thinning can and will occur if we do not remain on the path set by the Montreal Protocol Treaty.

2. **Biosphere Integrity:** The rate of biodiversity loss (terrestrial and marine) has escalated in the past 50 years, driven primarily by land use change for industrial agriculture. This has resulted in ecosystem damage and species extinction. When a species goes extinct, its function in the web of life is lost. If, for example, the extinct species is a key crop pollinator, you can imagine the damage done to farmers and the ability to feed people. Research is underway to gather data and understand variables that will help shape a boundary.

3. **Chemical Dispersion and the release of novel entities:** Emissions of toxic and long-lived substances such as synthetic organic pollutants, heavy metal compounds and radioactive materials represent some of the key human-driven changes to the planet. These compounds can have potentially irreversible effects on living organisms and on the physical environment (by affecting atmospheric processes and climate). Even when the uptake and bioaccumulation of chemical pollution is at sub-lethal levels for organisms, the effects of reduced fertility and the potential of permanent genetic damage can have severe effects on ecosystems far removed from the source of the pollution. Persistent organic compounds have caused dramatic reductions in bird populations and impaired reproduction and development in marine mammals. Further research is needed.

4. **Climate Change:** This Planetary Boundary has likely already been transgressed, as evidenced by the loss of summer polar ice. Continued pressure through deforestation techniques (especially tropical rainforests) will push Earth's systems past the tipping point. A precautionary approach would be to not continue on this path to avoid potentially cataclysmic consequences.

5. **Ocean Acidification:** Oceans absorb a quarter of human CO2 emissions, transforming them into carbonic acid and altering ocean chemistry and water pH. This process is devastating to coral and plankton populations, which are critical



to a balanced, functioning ocean. Upsetting the bottom of the food chain can pull the rug out from under the entire food pyramid. While all the boundaries are closely linked, ocean acidification is directly associated with and a result of climate change.

6. **Freshwater Use:** Human consumption is directly responsible for the loss of freshwater supplies. It is estimated that by 2050, approximately half a billion people will suffer from lack of access to freshwater. A boundary has been proposed to help manage local, regional, and continental needs.

7. **Land-system Change**: The global population continues to grow by the billions. Agricultural development to feed this population has caused the destruction of forests, wetlands, prairies, and other vegetation systems. This alters water flows and the natural cycling of carbon, nitrogen, and phosphorus in soil. In developing a boundary, the function, quality, and spatial distribution of a tract of land must be considered.

8. **Biochemical Flows (Nitrogen and Phosphorus Cycling):** Human industry and agricultural practices have altered natural cycles of these two elements, both of which are essential to plant growth. Human activity converts exorbitant amounts of atmospheric nitrogen into reactive nitrogen, which pollutes waterways and coastal zones. Over application of phosphorus fertilizers can have huge regional impacts; such as killing off shrimp populations in the Gulf of Mexico or creating dead zones in the oceans.

9. **Atmospheric Aerosol Loading:** This boundary is proposed to combat the effects of aerosols on Earth's climate system. Aerosols interact with water vapor and affect cloud formation and global and regional atmospheric circulation. Each year, an estimated 800,000 people die from consistently breathing aerosol-polluted air. However, interactions between aerosols and the atmosphere are complex, and this has hindered the clear characterization of this boundary.

In summary, we depend daily on biophysical processes for the food on our plate and the air we breathe. We are embedded in and connected to life support systems like biodiversity and eight others. Increasingly, bankers and investors get this connection. An injury to another species is an injury to humanity. The market must stop investing in industries destructive to the Planetary Boundaries if we are to support continued existence!

5. Externality Assessment in Food Production

POLICY GOALS	HIGH RISK, HIGH EXTERNALITY LOANS	LOW RISK, LOW EXTERNALITY INVESTMENTS
Increase agricultural productivity through livestock production	Industrial confinement livestock operations that require grain-based feeds, industrial breeds of high yielding animals that generate huge quantities of waste, and are dosed with antibiotics and other growth enhancing chemicals	Pastured, food-waste based, locally fed and adapted livestock stocked at appropriate rates that don't exceed grazing capacity; support silvopastoral systems that combine grazing and forest cropping in appropriate areas
Increase agricultural productivity through cereal and oilseed production	Industrial grain and cereal cropping systems heavily dependent upon external inputs (fertilizers, herbicides, pesticides, mechanization, irrigation) as well as GMO seeds	Promote crop rotations, compost, intercropping and other techniques to replace heavy reliance on chemical fertilizer and pesticide applications with natural farm management systems
Technical assistance on seeds and breeds	Herbicide tolerant transgenic (GMO) crops and industrial breeds (genetically narrow, dependent on grain, antibiotics, etc.)	Research in locally adapted seed varieties and breeds and farming methods that break cycles of dependency on patented seeds and external chemical inputs
Increase rural on-farm incomes	Government subsidized industrial production through corporately controlled enterprises	Diversified smallholder operations adapted for regional conditions, opportunities and needs including copperatives and other distribution and marketing networks
Reduce environmental impacts of agriculture	Industrialize the agricultural landscape	Harness natural processes such as nutrient cycling, biological nitrogen fixation, allelopathy, predation and parasitism to maximize yields
Resilience through soil protection	Machinery- and input-intensive monocultures or plantation operations, particularly without respect to erodibility, compatibility or the need to feed and restore organic matter and carbon in the soil	Maintain perennial buffers especially along waterways, between fields and on highly erodible soils; account for wind, rain and climate extremes; reforestation programs on pasture; increase soil organic matter to improve water retention and sequester carbon
Improve water quality for both rural and urban residents	Install costly water filtration infrastructure to clean polluted waters	Incentivize landowners and farmers within a watershed to protect land adjacent to fresh water sources
Address climate change through carbon sequestration	Intensive livestock, intensive fertilizer use, other energy-intensive forms of food production	Store or sequester carbon in the soil with a portion of permanent ground and forest cover on and around all farms in a region; promote use of bio-char, agroforestry, and other practices to create a positive carbon budget
Poverty reduction and strengthened food security	Enable foreign corporations to purchase and lease large agricultural lands rather than working to reduce the inequality gap among small landholders	Establish grain reserves and other local initiatives to soften impacts of food shortages and price spikes particularly in food insecure areas; strengthen land ownership rights among smallholders
Conservation	Infrastructure programs that fail to protect forests, grasslands or wetlands from being converted for agriculture	Adopt green payments programs such as the USDA Conservation Stewardship Program (approved by the World Trade Organization) as a model for incentivizing and monitoring on-farm energy conservation, chemical reductions, crop diversity and biodiversity protection
Green growth and economic diversification	Establish carbon markets that include participation of large agribusiness polluters	Quantify and minimize the impacts of system management on externalities such as greenhouse gas emissions, water and air pollution, biodiversity loss, and dispersal of pests, pathogens and weeds
Food System Development	Agriculture projects largely dependent upon export or commodity-based crops	Support cooperative infrastructure and farmer-to-farmer networks; improved extension services, education on conservation techniques, regional integration through cooperatives, farmer-to-farmer networks
Reduce Food Waste	Programs geared toward export oriented perishable markets	Programs that build infrastructure to reduce food waste — farm-to-table, storage, processing and distribution, composting, animal feeding programs, etc.
Pollinator Protection Programs	Chemical-intensive monocultures without thorough farm conservation plan requirements specifically geared toward native pollinator species	Teach farmers and landowners about the importance of maintaining connected native habitat to attract pollinators and beneficial insects throughout farm regions

6. BIOSPHERE SMART BANKING TOOLS TO ASSESS AGRICULTURE'S ECOLOGICAL IMPACTS (EXTERNALITIES)

As is well known, the global economic system often hides the pollution impacts in the process of pricing goods and services. Something serious has to be done to correct this and better connect development loans to the on the ground ecological reality of the projects. This must include a serious look at the ecological impact externalities in the supply chain as well.

There are many tools to identify pollution externalities, but it's not working in the sense of sufficiently stopping ecologically problematic development. For example, the Equator Principles have not stopped a single project (as of 2014) even though many development projects (such as pipelines crossing natural critical habitat) violate the principles. Proponents will argue that projects have been made less bad ecologically. Is that enough? No.

Some suggest bankers need a new simple and clear system–a quick easy checklist? Some suggest adding directions regarding specific impacts such as Nutrient Loading (NL). What standard of NL is acceptable? Make that explicit in loans and state the consequences if not abided by. Most important however, there needs to exist somewhere in the process of utilizing the externality identification tools the power to actually deny a loan application based on facts. When showcased, the pollution impacts clearly exacerbate already stressed ecological limits so we will not fund it.

The Problem Needing to be Fixed: Countries and developers seeking to borrow money to implement agricultural projects in a more ecologically responsible manner are often at a disadvantage to those agricultural project developers willing to cut corners and externalize their pollution.

Good agriculture, as we know, feeds people while working in concert with surrounding natural systems such as the habitat that supports pollinators and that supports fresh water flow and filtration. Bad agriculture degrades surrounding natural systems, sometimes to the point of no return. Smart bankers and investors need tools to help avoid problematic lending.

The Solution: Banks implement a relatively straightforward program via these simple steps:

1. Set up internal procedures and utilize tools to identify the ecological impact "externalities" at the earliest stage of the agricultural loan application;
2. Size those externalities up against the planet's already overloaded ecological limits (Planetary Boundaries);

7. Select Existing Tools Related to Assessing Externalities

Tool	For Whom	Built By	Region	Externality Assessed
GMap	IFC	WWF	Global	Biodiversity
OPAL	Government and Institutions	Natural Capital Projects	Global	Biodiversity
Global Water Tool (GWT)	Business	WBCSD	Global	Aquifer contamination, Biodiversity
IBAT	Government and Institutions	IUNC and UNEP	Global	Biodiversity
Ecological Footprint	Local Government	Global Footprint Network	Global	GHG
LADA	Local Government	FAO	Global	GHG, Soil
Our Ecosystem	Local government, business	Ecometrica	Global	Carbon Sequestration
FAOSTAT	Government	FAO	Global	GHG
AgFleet	Business	ZedX Inc.	USA	Land Use Change, Fertilizer, Pesticide, Herbicide, Soil
Planetary Boundaries	Government and Institutions	Stockholm Resilience Center	Global	Biosphere Integrity, Climate Change, Novel Entities, Ozone Depletion, Aerosol Loading, Ocean Acidification, Biochemical Flows, Freshwater Use, Land Use Change

*Note: Contact Foundation Earth for a longer list of tools and if you have case history information.

3. Say no to agricultural projects that exacerbate ecological limits, while financing ecologically restorative farming approaches; and
4. Incentivize loan officers to follow this stringent safeguard process with all development loans.

Studies indicate that agroecology (ecological farming) often fits the above prescribed approach and will more-effectively address planetary life support system issues such as biodiversity loss, nitrogen overload, climate change, while providing healthy food.

Various tools exist to help bankers assess different externalities. The important question to ask with any tool used by bankers or others to finance economic expansion:

How much traction does the tool (and the people using it) have in the process?

Foundation Earth is in the midst of collating a more complete list of tools available to assess the different externalities in the agricultural sector. We will distinguish tools designed for use by either bank loan officers or business proponents, or governments seeking MDB funding and make our recommendations.

8. "POTENTIAL REFORMS TO HUMAN RESOURCE INCENTIVES FOR WORLD BANK LOAN OFFICERS"

Alnoor Ebrahim and Steve Herz discussed motivating factors for loan officers in "Accountability in Complex Organizations: World Bank Responses to Civil Society." The authors comment that while the Bank itself acknowledges that there is "a high correlation between the extent and quality of public participation and overall project quality," this relationship doesn't always result in loan officers actively seeking out civil society engagement. The authors cite multiple reasons for this trend of disengagement.

1) Extensive civil society engagement and advice is not rewarded. While there are "considerable funds" available to managers for civil society engagement, they are not officially designated for that purpose. The effect of that ambiguity is that "those who are less interested face no positive incentives" and therefore perhaps are inclined not to seek out the resources given the additional paperwork involved. This issue becomes apparent in staff appraisals. According to the World Bank Humans Resources Department, the WBG has an annual review process. At the beginning of the year individual staff members work with their supervisors to set objectives, both individual, business and professional with a mid-year review to ascertain progress. However, while the officer's engagement with civil society does factor in, Ebrahim and Herz maintain that "staff appraisals do not evaluate the quality and impact of participatory mechanisms employed by staff," and consequently, "staff have neither positive nor negative incentives to improve the quality of participation beyond compliance with the letter of consultation requirements." When pressed for time and under deadline, a loan officer has no reason to go beyond the Bank's requirement. Since "the Bank has no mandatory requirements for whether or how to conduct a consultative process," officers are allowed to decide for themselves how much time or credence to award it.

2) Staff appraisals reward the ability to get projects approved and funds out the door. Towards the end of the year, staff's individual performance is assessed. This review considers the development objectives set for staff at the beginning of the cycle and the WBG core competencies based on self-evaluation, feedback from colleagues and supervisor evaluation. It is this end-of-year performance review that decides "the compensation adjustments" (i.e. pay-rise and bonuses). Ebrahim and Herz make clear that "moving money is valued for promotion while attention to participatory monitoring and evaluation is not." As a result, the best bet for a loan officer interested in career advancement is to rubber stamp proposals and approve funds in order to increase their total annual lending rather than engaging in the necessary environmental due diligence. The authors make clear that "the technocratic accountability regime in place at this level tends to reward and promote staff for their technical expertise and abilities to move money…incentives and resource allocations in the institution do not lend themselves to supporting the slow and sometimes controversial work in such engagement."

3) Getting the right training isn't rewarded. Loan officers face complex issues. Balancing environmental and social concerns with economic benefits is challenging. The officers often lack sufficient education on the issues at play to fully understand the dynamics or implications. Therefore they will frequently opt for the simplest option in an attempt to mitigate risk and decrease the likelihood of the project ending up before an inspection panel. However, this cautious approach tends to result in a business-as-usual model as opposed to taking risks on innovative thinking. This attitude of going for the known players and simplest options can result in large loans for large creditors who have a proven track record of success instead of officers selecting more ambitious projects such as an untested local smallholding cooperative, further perpetuating the influence that agribusiness conglomerates have globally.

9. GLOSSARY

Note: This glossary primarily clarifies the holistic and ecological perspective addressed in this paper.

Adaptation: (see Resilient)

Advanced Nation: One that lives largely within the means of its own ecosystems. Imports/Exports are primarily art, culture, and ideas. Imports are heavily screened on ecological and sociological footprint factors. People live dignified lives and nature flourishes with every subsequent generation of humans.

Alarmist: The purpose of an alarm is to wake you up so you can take decisive action. When the house is on fire, an alarm is not unimportant.

Biosphere: The realm of the living, the self-regulating zone of life. The global ecosystem. As poet Gary Snyder puts it, "...the Big Watershed." The part of the Earth's environment in which living organisms are found, and with which they interact to produce a steady-state system, effectively a whole-planet ecosystem. The boundary of our existence, the framework of human activity, the context within which we do everything. Think of it as no thicker than a coat of paint on a football. The Earth's biosphere is basically the sum of all the different living systems and the relationships they have with each other and with the non-living parts of our world, such as the water, air and rocks that enable them to function. It is the self-regulating zone of life, shielded from the icy vacuum of space by the atmosphere on which it depends. Earth-system science or biospheric science: The study of the whole Earth as a complex system beyond the sum of its parts, especially how the great cycles that make the planet a dynamic entity that supports life.

Biospheric Literacy: Understanding the basic immutable principles of how this planet works ecologically. Biospheric Literacy is represented by the study of physics. It is explained in the scientific principles of ecology. The field of general systems theory (i.e. systems thinking) is highly related. It is often poetically and powerfully expressed by Native Americans through their observations, oral tradition, and interaction with natural systems.

Carrying Capacity: (also see Phantom Carrying Capacity) the maximum population (plants or animals, such as deer) that a natural ecological system will support without undergoing deterioration.

Holistic Thinking: (See Systemic Thinking)

Life-support systems: A broad envelope for the survival of humans and others. Such systems allow us to feed, clothe, and house ourselves. Problems occur when we undercut fairly stable weather patterns, cause biodiversity loss, incur nutrient overenrichment in some places and nutrient depletion in other areas, acidify the oceans, or deplete freshwater. Note: If the life support systems in your spaceship were failing they would receive maximum attention.

One-planet living: A vision of a world in which people enjoy happy, healthy lives within their fair share of the earth's resources, leaving space for wildlife and wilderness.

Performance Standards: The official name given to the key environmental and social policies of the International Finance Corporation, the part of the World Bank Group that lends to the private sector (and also engages in joint equity investments on occasion with the private sector).

Overconsumption: If a material good or service irreparably stresses an ecosystem, causes the extinction of species, forces human communities to abandon their culture, or effectively enslaves them in a dominant economic system directly or indirectly, it is fair to consider this overconsumption.

Overpopulation: The 10-ton gorilla in the room that grows fatter every minute, almost at the pace of overconsumption and waste.

Phantom Carrying Capacity: (also see Carrying Capacity): illusory or the extremely precarious capacity of an environment to support a given life form or a given way of living. It can be quantitatively expressed as that portion of the population that cannot be permanently supported when temporarily available resources become unavailable. Precarious capacity means things like farming capacity that requires specific conditions, which can be disrupted by drought, flood, swarms of locusts, or reduced access to chemical fertilizers or large-scale machinery or bank credit or, in some cases, poorly-paid labor.

Principles of Ecology: The comprehensive and fundamental laws of organization common to all living systems.

Resilient: Resilient systems are easy to repair and are characterized by redundancy. The failure of any one component doesn't cause the entire system to crash. Elastic and recovering quickly. Resilience is the capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it.

Sustainability: It is way of life that is so diverse and rewarding that many would want to emulate it, and if they all did, the planet's natural systems (in which we are imbedded) and wildlife populations would flourish, increasingly, each generation, thus allowing for the continuance of all life. Therefore the political economy is in harmony with ecological health and operating within Earth's carrying capacity.

Systemic Thinking: Thinking in terms of relationships, context, patterns, embedded systems, and processes to achieve a more complete understanding of it all.

True Cost Economy: A holistic economy that operates within Earth's carrying capacity, especially by recognizing and avoiding ecological impacts (also known as shifted costs or externalities). It maintains the biosphere's life-support systems. It is one-planet living. The use of "Cost" in this phrase is not a financial term. If something cost you your life it would not be primarily a financial concern. If an economy were to cause a near-dead planet it would hardly be of financial concern to desperate people and the near-extinct or extinct species.

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WATERSHED MEDIA

● Of 1,313 globally threatened bird species, the amount to which agriculture is a contributing factor: 75% (Royal Society for the Protection of Birds) ● The true costs of cattle ranching in South America according to Pavan Sukhdev of The Economics of Ecosystems and Biodiversity (TEEB):18.8 times higher than revealed by market prices ● Percentage of the world's antibioitics now used in animal agriculture: 70 percent ● Estimated excess healthcare costs in the U.S. from antibiotic resistance according to the Centers for Disease Control and Prevention (CDC): US$20 billion annually ● Estimated reduction in agricultural emissions via a global shift away from the meat-intensive industrial diet and toward Mediterranean, vegetarian or pescatarian diets: 1.2–2.3 gigatonnes of carbon-dioxide carbon equivalents per year (translating to around 30–60% of the projected 2050 emissions from agriculture under the reference diet) from "Nature Food Choices for a Healthy Planet," Elke Stehfest ● Estimated reduction in cropland requirements in a global shift away from the meat-intensive industrial diet and toward Mediterranean, vegetarian or pescatarian diets: 450 million to 600 million hectares (about 20–30% of the projected 2050 cropland area for the reference diet) ● Estimated annual value of insect pollination to global agriculture: 153 billion Euros (Niccola Gallai, et. al.) ● Agriculture's estimated greenhouse gas emissions: 25 to 30 percent ● Percentage of average yield increases through green farming practices: 10% yield increase and a 7% reduction in poverty (TEEB) ● Number of daily calories currently provided by agriculture for each person on the planet: 2,800 ● Number of people who depend upon agricuture for their livelihood : 2.6 billion (WB)

ABOUT US

FOUNDATION EARTH is a national, non-profit, public-interest advocacy organization founded in 2011. Our focus includes: economic ecology models, technology, biospheric education, and earth jurisprudence. We call for a major rethink of society from the ground up. We envision more self-reliant communities embedded in a continental network of bioregional economies. Time is not on our side. A rapid shift from a polluting industrial society that ignores nature's carrying-capacity limits to a more holistic and responsible approach will require examining the dimensions of a deeply resilient low-impact economy and implementing it broadly. Foundation Earth provides advisory services concerning rapid systems change. Our mission is to bring an earth-centered "True Cost Economy" into reality.

WATERSHED MEDIA is a national non-profit that produces action-oriented, visually dynamic communication resources to influence the transition to a sustainable society. Watershed Media creates alliances with leading activist organizations and practitioners working on select issues to add expertise and credibility, and to more carefully assess best practices and frame long-term goals. Our projects are targeted to a specific audience that can benefit from and act upon the project's information and resources, for example, *Farming with the Wild: Enhancing Biodiversity on Farms and Ranches*. This book presented a bold new vision for agriculture, one in which farmers and ranchers work with wild nature, rather than against it.