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# Curtailing Ecosystem Exportation: Ecosystem Services As a Basis to Reconsider the Merits of Export-Driven Agriculture in Economies Highly Dependent on Agricultural Exports

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# CURTAILING ECOSYSTEM EXPORTATION: ECOSYSTEM SERVICES AS A BASIS TO RECONSIDER EXPORT-DRIVEN AGRICULTURE IN ECONOMIES HIGHLY DEPENDENT ON AGRICULTURAL EXPORTS

James Gathii\* and Keith H. Hirokawa\*\*

## ABSTRACT

Functioning ecosystems play a critical role in providing goods and services needed to sustain human life.<sup>1</sup> Water provision and filtration, biodiversity, nutrient cycling, climate regulation, and carbon sequestration are all examples of services ecosystems provide that no society could survive without.<sup>2</sup> Yet ecosystem services have historically been taken for granted, depleted by intention or ignorance, and replaced with inadequate substitutes.<sup>3</sup> Recent research on ecosystem services has exposed the shockingly high local, regional, and global costs of losing these essential services.<sup>4</sup>

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<sup>1</sup> The term, "ecosystem services" refers to "a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life." Gretchen C. Daily et al., *Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems*, 2 ISSUES IN ECOLOGY 1, 2 (1997), available at <http://goo.gl/z9KnS>; see also MILLENNIUM ECOSYSTEM ASSESSMENT: ECOSYSTEMS AND HUMAN WELL-BEING, Synthesis (2005), available at <http://www.maweb.org/documents/document.356.aspx.pdf>.

<sup>2</sup> Geoffrey Heal, et al., *Protecting Natural Capital Through Ecosystem Service Districts*, 20 STAN. ENVTL. L. J. 333, 336-37 (2001) ("Ecosystems deliver these societal benefits 'for free' and, in many cases, on a scale so large that humanity would find it practically impossible to substitute for them.").

<sup>3</sup> Joshua S. Reichert, *Perspectives on Nature's Services*, in NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS xvii, xviii-xix (Gretchen C. Daily ed., 1997) ("From time immemorial we have too lightly valued some of the most basic resources on which we depend, including the air we breathe, the water we drink, and the ability of the earth to support a wide variety of life. The cumulative impact of human activity on the natural system that produce these resources, particularly over the past one hundred years, and our rather recent understanding of the dramatic scope of that impact, make it impossible for us to take them for granted any longer.").

<sup>4</sup> Robert Costanza, et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253 (1997).

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The lessons from ecosystem services are applicable to export-driven trade strategies adopted by countries that heavily rely on agricultural exports. The Food and Agriculture Organization has designated such countries as Economies Highly Dependent on Agricultural Exports (EDAEs).<sup>5</sup> Kenya is a typical EDAE since it primarily relies on agriculture for a predominant share of its exports, domestic employment and gross domestic product (GDP). At present, approximately 80 percent of Kenyans labor in some aspect of agricultural production. Agriculture constitutes over 50 percent of the nation's GDP. Under these circumstances, Kenya's economy has come to rely on agricultural exports, resulting in policy incoherence: On one hand, there is a strong governmental bias in favor export-driven agricultural practices, and on the other hand, there is a strong need to protect the health of Kenya's natural capital. Therefore, it is not surprising that Kenya has attracted foreign investments in the agriculture industry for production of agricultural goods suitable for exportation into the global market, including coffee, tea, flowers, and green beans.

Because EDAEs are ill-equipped to decline foreign or local investment in their products and land, their export-driven policies are self-imposed, but also understandable.<sup>6</sup> Nevertheless, export-driven policies on agricultural trade are still taking a toll on natural capital.

<sup>5</sup> See generally FOOD AND AGRIC. ORG. (FAO), THE STATE OF FOOD AND AGRICULTURE (1992). (identifying twenty-four sub-Saharan African countries in this category; three in Latin America, Near East, and North Africa each, and eight in the Far East and the Pacific).

<sup>6</sup> See Andrew T. Guzman, *Why LDCs Sign Treaties That Hurt Them: Explaining the Popularity of Bilateral Investment Treaties*, 38 VA. J. INT'L L. 639, 657, 669-72 (1998) (explaining that poor countries sign investment treaties to attract foreign investment even though those treaties are often inimical to their best interests).

Production of these agricultural goods involves intensive uses of natural and human capital.<sup>7</sup> Unsustainable agricultural practices implemented to produce agricultural exports are depleting the soil and water and causing irreversible damage to the ability of many landscapes to provide ecosystem services. Because of their export driven agricultural policies, ecosystem services are being exported from EDAEs along with the products that ecosystems currently support.

Better attention to ecosystem services in EDAEs such as Kenya should compel a reconsideration of export-driven agriculture and trade policies that are detrimental to long-term ecosystem functionality. Specifically, an analysis of the effects of the current agricultural export bias reveals little incentive to assess the value of damage caused by agricultural practices that are depleting natural capital in developing countries.<sup>8</sup> The failure to integrate an ecosystem services valuation into export-driven trade policies leaves developing countries subject to the short-term benefits of agricultural practices that deny long-term ecosystem functionality. As such, the thesis of this essay is that export-driven trade policies that do not account for both an equitable distribution of natural capital wealth and the long-term sustainability of ecosystem services are likely to decrease the overall wealth of economies that are highly dependent on agricultural exports.

### I. AGRICULTURAL TRADE POLICIES TARGETING EXPORTS

Export-driven agriculture is a dominant driver in global economic development discussions. Even in subsistence agricultural communities, farmers are uprooting food crops to grow exportable crops and converting subsistence farms to commercial production. That the pervasiveness of this approach is even demonstrated outside of commercial agriculture suggests that the dominance of export-driven agriculture – and intensive agriculture in general – poses significant risks to ecosystems.

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<sup>7</sup> See generally JASON CLAY, *WORLD AGRICULTURE AND THE ENVIRONMENT: A COMMODITY-BY-COMMODITY GUIDE TO IMPACTS AND PRACTICES* 53 (Island Press 2004).

<sup>8</sup> Literature has identified the tensions between trade policies and environmental quality, and there has also been some recent research into the correlations between the locations of ecosystem services and poverty in Kenya to determine patterns of wealth distribution through infrastructure investments. But there has been less attention to the relationship between heavy agricultural export trade orientation, and its impact on natural capital and the continuing receipt (or lack thereof) of ecosystem services and their critical importance to human well-being. See WORLD RESOURCES INST., *NATURE'S BENEFITS IN KENYA: AN ATLAS OF ECOSYSTEMS AND HUMAN WELL-BEING* (2007), available at <http://www.wri.org/publication/content/9373>; see also INT'L INST. FOR SUSTAINABLE DEV., *CONNECTING POVERTY & ECOSYSTEM SERVICES: A SERIES OF SEVEN COUNTRY SCOPING STUDIES, FOCUS ON KENYA* (2005), available at [http://www.iisd.org/pdf/2005/economics\\_poverty\\_kenya.pdf](http://www.iisd.org/pdf/2005/economics_poverty_kenya.pdf).

### A. Export Bias in Trade Policy

Export-led growth has been a major economic development policy around the world since the end of the 1980's. Export-led growth is the preferred alternative to central or state led planning which characterized economies around the world prior to the 1980's. Unlike export-led growth, central planning was accompanied by import substituting industrialization. At the time, whatever the weaknesses of central planning, it was assumed to be "very good at general industrial growth."<sup>9</sup> The end of the Cold War marked the end of the heyday of central planning and import substituting industrialization. Today, leading international economic organizations such as the World Bank, World Trade Organization, and the International Monetary Fund, (IMF), prescribe outward orientation through trade liberalization as the best way to guarantee economic growth for industrialized and non-industrialized agricultural economies.

Export oriented economic policy is part of the dominant economic orthodoxy today. The other elements of this orthodoxy include fiscal discipline, redirection of public expenditures to fields offering high economic returns, tax reform, interest rate liberalization, a competitive exchange rate, trade liberalization, liberalization towards foreign direct investment, and privatization.<sup>10</sup> These elements of the Washington Consensus, originally outlined in 1989, were (and continue in many respects to be) prescribed as necessary to promote economic development initially in Latin America and subsequently to developing countries in general.<sup>11</sup> Three of the primary elements of this consensus are trade openness, openness to foreign direct investment, and market economy. Advocates of this agenda recommended that developing countries could achieve economic development by liberalizing their markets and dismantling the welfare state in so far as services such as energy, telecommunications, and water were provided by the State.<sup>12</sup> The IMF, the World Bank, and bilateral lenders have used many of

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<sup>9</sup> Paul Krugman, *Cycles of Conventional Wisdom on Economic Development*, 71 INT'L AFF. 717, 718 (1995).

<sup>10</sup> Joel M. Ngugi, *Policing Neo-Liberal Reforms: The Rule of Law as an Enabling and Restrictive Discourse*, 26 U. PA. J. INT'L ECON. L. 513, 584 (2005).

<sup>11</sup> See John Williamson, *The Washington Consensus as Policy Prescription for Development*, Lecture at the World Bank in the series "Practitioners of Development" (Jan. 13, 2004), available at <http://www.iie.com/publications/papers/williamson0204.pdf>.

<sup>12</sup> See Justice Chimugwanya Nwobike, *The WTO Compatible ACP-EU Trade Partnership: Interpreting the Reciprocity Requirement to Further Development*, 8 ASPER REV. INT'L BUS. & TRADE L. 87, 101 (2008).

these elements as conditions for developing countries to access the funds lent to them.<sup>13</sup>

The Washington Consensus, or neo-liberalism, has undergone its own metamorphosis. The inclusion of social safety nets and directing aid funding through non-governmental organizations are examples of such modifications.<sup>14</sup> However, the center of this economic orthodoxy – the promotion of market governance with a view toward increasing the role of the private sector as the engine for economic growth, and to free market forces from the clutches of state regulatory control – has remained the same. The commitment to export-led growth is a central element of this economic orthodoxy.

In the initial phases of the Washington Consensus, developing countries were required to adopt its elements, including adopting production for exports as an economic growth strategy. Today, these commitments have come to represent a consensus among the governments and business interests in developing countries. The idea that an economy grows through exports has become one of the most widely-shared ideas among those in charge of national economies around the world. This consensus is reflected in the proliferation of bilateral and regional trade agreements within and between countries of all economic levels.<sup>15</sup>

The United States, Europe, Africa, Asia, Latin America, and elsewhere, are committing to a spiraling and ever growing web of trade agreements. The growth of these agreements is evidence of the importance attached to exports and trade openness as elements of economic growth. In the United States, President Obama has made doubling exports in five years a central goal of his job creation agenda.<sup>16</sup> For President Obama, trade agreements serve as the foundation of his plan to create two million jobs under the National Export Initiative intended “to help farmers and small businesses increase their exports, and reform export controls consistent with national security.”<sup>17</sup> The United States has already entered into several trade agreements to achieve this goal and is in the process of negotiating several others.

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<sup>13</sup> See *id.*

<sup>14</sup> See Kerry Rittich, *The Future of Law and Development: Second Generation Reforms and the Incorporation of the Social*, in *THE NEW LAW AND ECONOMIC DEVELOPMENT: A CRITICAL APPRAISAL* (David M. Trubek and Alvaro Santos eds., 2006).

<sup>15</sup> See James Gathii, *The Neo-Liberal Turn in Regional Trade Agreements*, 86 WASH. L. REV. 421 (2011).

<sup>16</sup> U.S. President Barack Obama, State of the Union Address to Congress (Jan. 27, 2010), available at [http://trade.gov/press/publications/newsletters/ita\\_0210/nei\\_0210.asp](http://trade.gov/press/publications/newsletters/ita_0210/nei_0210.asp) (last visited Sept. 8, 2011).

<sup>17</sup> *Id.*

Likewise, the EU's commitment to export-led growth is reflected in its 2020 Strategy.<sup>18</sup> This strategy argues that the "EU will require a stronger export orientation" to create more growth and jobs.<sup>19</sup> The 2020 Strategy makes the case for a strong and positive link between trade and growth. Several reasons are given for this linkage:

[Trade] openness enhances efficient resource allocation. It creates incentives for capital and labour to be put to work in areas with the highest return. Second, trade facilitates the dissemination of knowledge and innovations embodied in goods, services and investments. Third, open trade encourages competition and thereby provides an incentive to supply the best quality/price ratio of goods to consumers and to increase productivity. Fourth, opening up trade gives producers access to larger markets and hence, the possibility to reap the benefits of increasing returns to scale and specialization.<sup>20</sup>

In short, the EU attributes three critical benefits to trade opening: economic growth, consumer benefits, and employment.<sup>21</sup>

The wide and broad acceptance of an export bias in economic growth strategies also prevails in developing countries such as Rwanda—a tiny land locked country in East Africa. Like the EU, a central plank of Rwanda's Vision 2020 is regional and international economic integration. Rwanda's goal is to become a middle income country through export-led growth and the adoption of a liberal market

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<sup>18</sup> *Communication From the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions (Trade, Growth and World Affairs), Trade, Growth and World Affairs, Trade Policy as a Core Component of the EU's 2020 Strategy*, COM (2010). 612 final (Nov. 9, 2010).

<sup>19</sup> *Commission Staff Working Document, Trade as a Driver of Prosperity, accompanying Communication From the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions (Trade, Growth and World Affairs), Trade, Growth and World Affairs, Trade Policy as a Core Component of the EU's 2020 Strategy*, at 4, SEC (2010) 1269.

<sup>20</sup> *Id.* at 8-9.

<sup>21</sup> This 2020 Strategy is a continuation of the EU's trade agenda embodied in the October 2006 Global Europe Strategy. The primary goal of this Global Europe Strategy was to make Europe more competitive by giving "a sharper focus on market opening and stronger rules in new trade areas of importance to the [EU], notably intellectual property (IPR), services, investment, public procurement and competition." Trade Policy Review Body Report, *European Communities-Trade Policy Review*, 11, WT/TPR/G/177 (Jan. 23, 2007), available at [http://www.wto.org/english/tratop\\_e/tpr\\_e/g177\\_e.doc](http://www.wto.org/english/tratop_e/tpr_e/g177_e.doc). In this strategy, the EU declared the need for comprehensive trade agreements that would uphold the need to protect the competitiveness of EU's markets while safeguarding EU export interests through tariffs and non-tariff barriers. See *Communication From the Commission to the European Parliament, The Council, The European Economic and Social Committee, Global Europe: Competing in the World*, Com (2006) 567 final (Oct. 4, 2006), available at [http://trade.ec.europa.eu/doclib/docs/2006/october/tradoc\\_130376.pdf](http://trade.ec.europa.eu/doclib/docs/2006/october/tradoc_130376.pdf) [hereinafter *Global Europe Strategy*].

economy.<sup>22</sup> The other five pillars of this vision are (1) private sector-led economy; (2) good governance and a capable state; (3) human resource development and a knowledge based economy; (4) infrastructure development; and (5) productive and market-oriented agriculture.<sup>23</sup>

Rwanda's economic reforms have been so impressive that western aid donors have ignored the political repression of the opposition in Rwanda.<sup>24</sup> This is also true of other economic reformers, such as Uganda's Yoweri Museveni and, to some extent, Ethiopia's Meles Zenawi, who have all embraced market governance, including export orientation as a central economic strategy.<sup>25</sup> Clearly there are other factors at play here, including the very powerful influences of donor agencies such as the United States Agency for International Development and the U.K.'s Department for International Development.<sup>26</sup> Influential parties also include African government bureaucrats, civil society groups, and organizations whose budget lines depend on these market oriented donors and who invariably subscribe to market governance ideas such as export orientation for self-interested reasons. Small countries like Rwanda may adopt neo-liberal ideals such as export-led growth and seek to reproduce it for selfish reasons such as attracting foreign investment. After all, adoption of market governance – including an export orientation – has been embraced within a community of mutual recognition that includes prospective investors and business intermediaries, such as banks and insurance companies.<sup>27</sup>

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<sup>22</sup> See generally REPUBLIC OF RWANDA, RWANDA VISION 2020 (2010), available at [http://www.minecofin.gov.rw/webfm\\_send/1700](http://www.minecofin.gov.rw/webfm_send/1700) (last visited Sept. 8, 2010).

<sup>23</sup> *Id.* at 11.

<sup>24</sup> See *Efficiency Versus Freedom: The West Should Not Be Silent When Efficient Leaders, Such as Rwanda's, Squash the Opposition*, THE ECONOMIST, Aug. 5, 2010, <http://www.economist.com/node/16743333> (last visited Sept. 8, 2011)..

<sup>25</sup> See Jason McLure, *Why Democracy Isn't Working: Despite an Economic Renaissance, much of Africa is Drifting Toward a New Age of Authoritarianism*, NEWSWEEK, Jun. 18, 2010, <http://www.newsweek.com/2010/06/18/why-democracy-isn-t-working.html> (last visited Sept. 8, 2011). Museveni's re-election in February of 2011 resulted in a congratulatory message from the U.S. State Department which also noted the limitations Museveni had placed on the opposition to campaign freely without intimidation, electoral irregularities such as voter bribery, and use of state funds to help Museveni retain power, as well as the fact there was no independent electoral commission in place. See Philip J. Crowley, Assistant Secretary, Bureau of Public Affairs, Uganda's Elections, Press Statement (Feb. 27, 2011), <http://www.state.gov/t/pa/prs/ps/2011/02/156940.htm>.

<sup>26</sup> *Id.* See also DAMBISA MOYO, DEAD AID: HOW AID IS NOT WORKING AND HOW THERE IS A BETTER WAY FOR AFRICA (2009).

<sup>27</sup> See generally Alexander Wendt, *Anarchy is What States Make of It: The Social Construction of Power Politics*, 46 INT'L ORG. 413 (1992) (discussing the community of mutual recognition).

Adoption of these reforms also serves as a signaling device that their investments would be protected in that country.<sup>28</sup>

Another reason for the subscription to trade openness or export orientation is that there is a much broader group of economists, including economists in the governments of developing countries, who studied in economics departments that fully subscribe to neo-liberal economic reformism and who have come to believe in the efficacy of its ideals. Yet, clearly neo-liberalism has been adopted by this wide array of actors—including government economists and non-governmental activists—in their interactions with each other, and the actors' adoptions of neo-liberal ideals cannot be solely accounted for by a narrative of imposition through conditionalities.<sup>29</sup> Once created, these inter-subjective understandings and expectations acquire a self-perpetuating character.<sup>30</sup>

### *B. Extensive Agricultural Export Sector*

The Food and Agriculture Organization has designated countries whose economies depend on agricultural exports as Economies Highly Dependent on Agricultural Exports (EDAEs)<sup>31</sup> An EDAE has the equivalent of “one-fifth or more of total export earnings or one-fifth or more of their total imports in 1988-1990”<sup>32</sup> from agriculture. The FAO has identified 24 sub-Saharan African countries in this category: three in Latin America, the Near East, and North Africa, and eight in the Far East and the Pacific. Those countries can be seen in Table 1. Each of these countries relies on agriculture for a predominant share of its exports, domestic employment, and GDP. A majority of the population in each of these countries is engaged in the agricultural sector. Consequentially agriculture serves a critical component of each country's well-being, not only because of the foreign exchange earned by exports, but also because it is a source of domestic subsistence and employment.

**Table 1: Economies highly dependent on agricultural exports**

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<sup>28</sup> See Beth Simmons, *Money and the Law: Why Comply With the Public International Law of Money*, 25 YALE J. INT'L L. 323, 342 (arguing that the IMF uses its sanctioning power sparingly since most States comply with IMF policies because compliance signals that their money is safe and non-compliance would make their countries uncompetitive).

<sup>29</sup> Wendt, *supra* note 27, at 410 (citing Richard Ashley in arguing that collective identities are far ‘from being exogenously given’ constituted by intersubjective knowledge that is “constructed everyday by processes of ‘social will formation.’”).

<sup>30</sup> *Id.* at 411.

<sup>31</sup> FAO, *supra* note 5, at 12.

<sup>32</sup> *Id.* at 12.

<i>Latin America and Caribbean</i>	<i>Far East and Pacific</i>	<i>Sub-Saharan Africa</i>
Argentina	Sri Lanka	Côte d'Ivoire
Paraguay	Thailand	Malawi
Honduras	Afghanistan	Zimbabwe
Cuba	Viet Nam	Mali
Uruguay	Malaysia	Sudan
Brazil		Madagascar
Guatemala		Burundi
Costa Rica		Cameroon
Colombia		Ghana
Saint Vincent and the Grenadines		Liberia
Ecuador		Uganda
Guyana		Kenya
Belize		Ethiopia
Dominica		Rwanda
Nicaragua		Swaziland
El Salvador		Mauritius
Dominican Rep.		Central African Rep.
Sao Tome and Principe		Tanzania United Rep.
		Chad
		Burkina Faso
		Somalia
		Benin
		Guinea-Bissau
		Gambia

*Source: FAO, The State of Food and Agriculture, 12 (1992).*

Agriculture is the cornerstone of economic development in many African countries. Eighty percent of the population in Africa still relies heavily on the agricultural industry to support their countries' economies.<sup>33</sup> Mr. Sindiso Ngweya, Secretary General of Common Market for Eastern and Southern Africa (COMESA), calls agriculture the "engine for economic development."<sup>34</sup> In fact, in the 1992-1993 period, agricultural products accounted for around thirteen percent of all developing country exports, but accounted for twenty percent of Africa's exports.<sup>35</sup> Yet agricultural trade experiences major problems—including the inability of these countries to expand their export volumes as export prices fall, and increases in volume and value of imports with deteriorating terms of trade for their exports.<sup>36</sup> This is particularly so for EDAEs that are highly dependent on the export of a single commodity. For example, Malawi is highly dependent on tobacco. Kenya, which is a low-income food deficit country,<sup>37</sup> depends on a broader range of agricultural exports but has a concentration of poverty in agriculture.<sup>38</sup>

## II. ECOSYSTEM SERVICES AND EXPORT-DRIVEN AGRICULTURE

In an important sense, ecosystems are a form of wealth. Ecosystems provide services that are critical for human survival and costly to replace. Agricultural practices often interfere with the ability of ecosystems to continue delivering such services. Moreover, export-driven agriculture policies contribute to the loss of ecosystem services by encouraging short-term production over long-term ecosystem functionality.

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<sup>33</sup> Press Release, African Union Commission, CAADP Day: African Union Promotes Agricultural Development in Africa (June 29, 2009), available at <http://appablog.wordpress.com/2009/06/29/caadp-day-african-union-promotes-agricultural-development-in-africa/> (last visited 25 Oct. 2010) [hereinafter CAADP Press Release].

<sup>34</sup> Sindiso Ngwenya, Secretary General of COMESA, Remarks at COMESA's Second Africa Agriculture Markets Programme Policy Seminar, David Livingston Hotel, Livingston, Zambia (June 15, 2009), <http://goo.gl/v5ill> (last visited Aug. 21, 2010) [hereinafter Ngwenya Speech].

<sup>35</sup> FAO, *supra* note 5, at 10.

<sup>36</sup> *Id.* at 14.

<sup>37</sup> Low-income food deficit countries are defined as countries whose food imports absorbed one-fourth or more of their total export earnings in the 1988-1990 period. *See id.* at 12.

<sup>38</sup> Kenya's primary agricultural exports are tea, coffee and horticultural products which account for three-quarters of total agricultural exports. TIM RUFFER ET AL., OXFORD POLICY MANAGEMENT: DEVELOPMENT TOOLBOX PROPOSALS AND THEIR POTENTIAL EFFECT ON DEVELOPING COUNTRIES, VOL. 2 COUNTRY CASE STUDIES 3-4 (April 2002).

### A. An Introduction to Ecosystem Services

Functioning ecosystems are essential to human well-being,<sup>39</sup> they “provide basic life support for human and animal populations and are the source of spiritual, aesthetic, and other human experiences that are valued in many ways by many people.”<sup>40</sup> Ecosystems provide services that humans cannot live without, such as contaminant filtering of water by soils and vegetation, processes that support food production or provide protection from severe weather events. There are even ecosystem characteristics upon which cultures rely so heavily that they emulate these characteristics in particular cultural icons and practices. These services are so critical that when ecosystems begin to fail, society must substitute or replicate ecosystem processes to ensure human survival.

Historically, many ecosystem services have been either undervalued or perceived as having no financial value.<sup>41</sup> Natural capital resources were thought to be endless<sup>42</sup> and “accrue directly to humans without passing through the economy at all. In many cases people are not even aware of them.”<sup>43</sup> Because so many of our daily decisions are centered on commercial solutions and exchanges, and because most ecosystem processes have been assigned little or no commodity value, many ecosystem processes, structures, and functions continue to be undermined.<sup>44</sup> Political and legal institutions have encouraged the consumption of ecosystem goods in a manner that interfered with the natural processes that provide air and water filtration, soil and climate regulation, flood protection, and biodiversity maintenance.<sup>45</sup> Recently,

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<sup>39</sup> Daily et al., *supra* note 1, at 2; Costanza et al., *supra* note 4; MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 1, at v.

<sup>40</sup> U.S. Envtl. Prot. Agency Science Advisory Board, *Valuing the Protection of Ecological Systems and Services* 8 (EPA-SAB-09-012)(May 2009), available at <http://www.epa.gov/ecology/publications.htm>.

<sup>41</sup> Geoffrey Heal, et al., *supra* note 2, at 336-37 (“Ecosystems deliver these societal benefits ‘for free’ and, in many cases, on a scale so large that humanity would find it practically impossible to substitute for them.”).

<sup>42</sup> Robert Costanza & Herman E Daly, *Natural Capital and Sustainable Development*, 6 CONSERVATION BIOLOGY 37, 39-40 (1992).

<sup>43</sup> Costanza et al., *supra* note 4, at 257.

<sup>44</sup> See generally, NATURE’S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS (Gretchen C. Daily ed., 1997).

<sup>45</sup> To understand the intricacies of the project and provide a better accounting for the value attributable to ecosystems, ecosystem services have been characterized according to the type of services provided: “provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.” MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 1, at V.

the Millennium Ecosystem Assessment provided a bleak outlook by reporting that in over sixty percent of the ecosystem services studied, degradation and destruction is outpacing their ability to adapt, absorb changes, or otherwise recover.<sup>46</sup>

The idea of accounting for the value of ecosystem services is steadily emerging as an effective approach for identifying value in ecosystem processes and the costs of changing landscapes. Ecosystem services valuation champions a functional understanding of nature's value and our economic dependence on ecosystems. As such, the integration of ecosystem services into governmental policy and decision-making processes is essential for community recovery. The ecosystem services approach changes the tone of asset management by capturing the value of these previously ignored ecosystem functions.<sup>47</sup> Of course, in many cases the value will be apparent only after an ecosystem has been degraded and no longer has the capacity to perform.<sup>48</sup> Yet by recognizing value in ecosystem processes and functions, and by accounting for ecosystems as capital assets, it is easier to understand why otherwise unrelated practices and policies can have a significant impact on wealth distribution and maintenance. Any decision that involves some interaction with the landscape can be valued in a natural capital accounting "insofar as they either change the benefits associated with human activities or change the costs of those activities."<sup>49</sup> From this perspective, the ecosystem services concept has enabled governments to re-envision the manner in which they inventory and value their assets.

Agricultural production is an example of a provisioning ecosystem service. However, in general, agricultural productivity (in both commercial and subsistence farming) depends on the continued delivery of ecosystem services from functioning ecosystems.<sup>50</sup> For instance,

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<sup>46</sup> *Id.* at 1.

<sup>47</sup> John Porter et al., *The Value of Producing Food, Energy, and Ecosystem Services within an Agro-Ecosystem*, 38 *AMBIO* 186, 186 (2009).

<sup>48</sup> NAT'L RESEARCH COUNCIL, COMM. ON ASSESSING AND VALUING THE SERVICES OF AQUATIC AND RELATED TERRESTRIAL ECOSYSTEMS, *ECOSYSTEM SERVICES: TOWARDS BETTER ENVIRONMENTAL DECISION-MAKING* 154 (2004) ("the value of ecosystem services becomes apparent only after such services are diminished or lost, which occurs once the natural processes supporting the production of these services have been sufficiently degraded.").

<sup>49</sup> Such circumstances have value "insofar as they either change the benefits associated with human activities or change the costs or those activities." Costanza et al., *supra* note 4, at 255. See also Gretchen C. Daily et al., *Ecosystem Services in Decision Making: Time to Deliver*, 7 *FRONTIERS IN ECOLOGY & THE ENV'T* 21, 23 (2009) ("The main aim in understanding and valuing natural capital and ecosystem services is to make better decisions, resulting in better actions relating to the use of land, water, and other elements of natural capital.").

<sup>50</sup> Wei Zhang et al., *Ecosystem Services and Dis-services to Agriculture*, 64 *ECOLOGICAL ECON.* 253, 253 (2007) ("Agricultural ecosystems both provide and rely upon important

“[s]oil structure and fertility play a large role in determining where different kinds of farming take place and the quantity and quality of agricultural output.”<sup>51</sup> Crop yields typically require clean and ample water delivered (and metered) from upstream wetlands, forested watersheds, and aquifers.<sup>52</sup> Many of these services that benefit agriculture as nonagricultural ecosystem processes have a less obvious use in the agricultural process. Natural pest regulation,<sup>53</sup> pollination,<sup>54</sup> nutrient cycling,<sup>55</sup> and climate control<sup>56</sup> are essential for productive farming, but because they occur in nonagricultural ecosystem processes they are not often accounted for in agricultural operations.

### *B. Ecosystem Services Tradeoffs in Commercial Agriculture*

Increasing populations and complex economic dependencies have spurred a need to increase productivity in agricultural operations, yet the need for increasing agricultural productivity has resulted in significant

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ecosystem services (ES).”); INT’L INST. FOR SUSTAINABLE DEV., *supra* note 8, at 11 (“If the cultivation of plants for food and livestock is to succeed, then natural factors such as fertile soils, adequate soils moisture, suitable climatic conditions and a rich source of plant and animal species are necessary.”).

<sup>51</sup> Zhang et al., *supra* note 50, at 255. See also CLAY, *supra* note 7, at 46 (“Soil can reduce or create greenhouse gases, crumble bedrock, and purify all the fresh water on the planet. Healthy soil biota can facilitate some ten times the nutrient uptake and equal or greater biomass production as degraded soils with only a tenth of applied solid nutrients.”)(citations omitted).

<sup>52</sup> Zhang et al., *supra* note 50, at 255 (“Water provision and purification fulfill requirements for water of sufficient quantity, timing, and purity for agricultural production. Vegetation cover in upstream watersheds can affect the amount, quality, and stability of the water supply to agriculture. It is not clear that maintaining forest cover increases the absolute amount of water supplied to downstream areas. Other vegetation may do just as well. What is clearer is that forests stabilize water flow to reduce differences in flow between wet and dry seasons. Forests can also stabilize soil to reduce sediment load in rivers.”)(citations omitted).

<sup>53</sup> *Id.* (“Insects provide vital ES to agriculture including dung burial, pest control, and pollination. Beetles in the family Scarabaeidae are especially efficient at providing dung burial services. They decompose wastes generated by large animals (a potential EDS from agriculture), thereby recycling nitrogen, enhancing forage palatability, and reducing pest habitat, resulting in significant economic value for the cattle industry.”)(citations omitted).

<sup>54</sup> *Id.* (“Crop pollination is perhaps the best known ES performed by insects. The production of over 75% of the world’s most important crops that feed humanity and 35% of the food produced is dependent upon animal pollination.”).

<sup>55</sup> *Id.* (“Earthworms and macro- and micro-invertebrates increase soil structure via burrows or casts and enhance soil fertility through partial digestion and communion of soil organic matter. Nutrient cycling maintains soil fertility.”)(citations omitted).

<sup>56</sup> *Id.* at 256 (“Another (abiotic) form of ES to agriculture involves climate, including temperature and precipitation regimes but also the frequency and severity of extreme weather, droughts, floods, etc. Favorable climate confers a cost advantage to those who farm there. Suitable and stable climate relies on atmospheric regulation, which like many other ES is influenced by the functioning of multiple ecosystems.”).

tradeoffs between ecosystem services.<sup>57</sup> Although the impacts have been particularly severe in aquatic ecosystems, the resulting degradation has been broadly felt. The Millennium Assessment reports as follows:

Agricultural development has historically been the principal cause of the loss of inland water systems worldwide (high certainty). It is estimated that by 1985, 56–65% of suitable inland water systems had been drained for intensive agriculture in Europe and North America, 27% in Asia, and 6% in South America. The construction of dams and other structures along rivers has resulted in fragmentation and flow regulation of almost 60% of the large river systems in the world. In many countries, the construction of large dams is still a controversial issue. Water pollution and eutrophication are widespread and in many countries have led to the degradation of many inland water systems. In addition to direct adverse effects on biodiversity, pollution has reduced the capacity of inland waters to filter and assimilate waste. Threats of water quality degradation are most severe in areas where water is scarce (dryland systems). Toxic substances and artificial chemicals are increasingly being released into waterways, with uncertainty about their long-term effects on ecosystems and humans. In recent years the devastation caused by invasive species has been increasingly recognized worldwide.<sup>58</sup>

By focusing on how ecosystem services are ignored and undermined by agricultural practices, the benefits of cultivation and “improvement” of ecosystems can be placed in context.<sup>59</sup> Ecosystem services valuation

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<sup>57</sup> MILLENNIUM ECOSYSTEM ASSESSMENT: A TOOLKIT FOR UNDERSTANDING AND ACTION: PROTECTING NATURE'S SERVICES. PROTECTING OURSELVES 5 (2007), available at [http://islandpress.org/assets/library/27\\_matookit.pdf](http://islandpress.org/assets/library/27_matookit.pdf) (“By reshaping ecosystems, we have improved the lives of billions. Human well-being, on average across and within many societies, has improved substantially over the past two centuries. More people are better nourished than ever before. People live longer, and incomes have risen. But the changes we have made to natural systems are not without costs.”); see also MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 1, at 1 (“Everyone in the world depends completely on Earth’s ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfillment, and aesthetic enjoyment. Over the past 50 years, humans have changed these ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This transformation of the planet has contributed to substantial net gains in human well-being and economic development. But not all regions and groups of people have benefited from this process—in fact, many have been harmed. Moreover, the full costs associated with these gains are only now becoming apparent.”).

<sup>58</sup> C. Max Finlayson, et al., *Inland Water Systems*, in MILLENNIUM ECOSYSTEM ASSESSMENT, CURRENT STATE & TRENDS ASSESSMENT 551, 553 (2005), available at <http://www.millenniumassessment.org/documents/document.289.aspx.pdf>.

<sup>59</sup> Costanza & Daly, *supra* note 42, at 40 (“At present, “we are . . . entering an era, thanks to the enormous increase of the human scale, in which natural capital is becoming the limiting factor.”).

enables an accounting of not just the agricultural goods produced, but also the ecosystem processes and functions that are adversely (and sometimes permanently) impacted by agricultural land uses.<sup>60</sup> That is, we can value as tradeoffs the loss of certain ecosystem services by the costs that will be made necessary once the ecosystem processes are no longer able to deliver the benefits. For example, wetlands typically contain extremely fertile and productive soils, but these soils cannot be used without transforming wetlands and eliminating or interrupting the hydrological processes that helped to maintain fertility in those soils.<sup>61</sup> Soil services from wetlands are examples of ecosystem services that are essential to crop production but displaced in the conversion of watersheds to farmlands.<sup>62</sup>

Other tradeoffs may be considered more insidious because they seem more avoidable. For instance, aquifers and surface water bodies are often left degraded and undrinkable due to the overuse of or failure to contain fertilizers and pesticides.<sup>63</sup> Monocultural production threatens biodiversity maintenance and the conversion of marginal areas from habitat to farmlands.<sup>64</sup> Improper disposal of agricultural waste affects ecosystem processes in the air, water, and land.<sup>65</sup> Farming practices

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<sup>60</sup> See Paul Rodriguez et al., *Interactions among Ecosystem Services*, in MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: VOL. 2 SCENARIOS 431, 434 (“A better knowledge of trade-offs and synergisms would simplify environmental decision-making.”).

<sup>61</sup> INT’L INST. FOR SUSTAINABLE DEV., *supra* note 8, at 13 (“Soil fertility loss and the degradation of water resources have directly undermined agricultural production with deforestation from agriculture, timber-based industry and energy generation being contributing factors to soil degradation and loss of watershed function.”).

<sup>62</sup> David Tillman, *Global Environmental Impacts of Agricultural Expansion: The Need for Sustainable and Efficient Practices*, 96 PROC. NAT’L. ACAD. SCI. USA 5995, 5998 (1999) (noting that, in some cases, “the best way to regain soil fertility lost because of tilling is to allow re-establishment of the native ecosystem”).

<sup>63</sup> INT’L INST. FOR SUSTAINABLE DEV., *supra* note 8, at 15 (“Water quality degradation has also increased due to increased use of pesticides and fertilizers. Pesticides, such as highly-toxic methyl bromide, are applied to flower plantations, threatening nearby Lake Naivasha, one of Kenya’s few freshwater lakes.”); *see id.* (“Nutrients and pesticides can run off from agricultural fields into nearby streams, rivers, lakes, and estuaries, . . . leading to declines in water quality. Thus, use of nutrients and pesticides to increase agricultural production can lead to critical declines in water quality.”); *see also* Rodriguez et al., *supra* note 60, at 435 (“Agricultural production shows an inverse relationship with water quality and quantity: as we increase agricultural production, the quality of water and the quantity available tend to decrease.”).

<sup>64</sup> Tillman, *supra* note 62, at 5999 (“A hallmark of modern agriculture is its use of monocultures grown on fertilized soils.”).

<sup>65</sup> CLAY, *supra* note 7, at 53 (“Another often overlooked but important cause of land and water pollution is the improper disposal of by-products and waste generated during production and processing of agricultural crops. Agricultural waste and by-products are often heaped and left to rot where they are created. They can become breeding grounds for pests. Sometimes they are dumped into rivers, where they absorb oxygen as they decompose, which in turn can asphyxiate

have also resulted in massive soils erosion<sup>66</sup> and left ecosystems and human populations ill-equipped to fight or control disease.<sup>67</sup> These agricultural practices are driven by the demands of agricultural productivity but, both individually and cumulatively, they inhibit the ability of ecosystems to continue delivering essential services in ways that may be invisible.<sup>68</sup> In some cases, these essential services can be replaced with substitutes,<sup>69</sup> although the cost of providing such replacements will often exceed the cost of maintaining the natural ecosystem processes.<sup>70</sup>

A great deal is known about the demands that agricultural production makes on ecosystems in developing countries.<sup>71</sup> For instance, production of cut flowers has been associated with a wide variety of impacts to ecosystem services and ecosystem needs: “Over exploitation of water resources by the flower growers has been held responsible for falling water levels, whilst a growing population on the lake shore (some of whom have been drawn there in search of employment) has

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fish and other aquatic organisms. In other places the age-old practice of burning is used to dispose of agricultural waste, but this leads to air pollution.”)

<sup>66</sup> *Id.* at 47 (“Scientists have estimated the global cost of soil erosion at more than \$400 billion of damage each year to agricultural land and indirect damage to waterways, infrastructure, and health.”).

<sup>67</sup> MILLENNIUM ECOSYSTEM ASSESSMENT: ECOSYSTEMS AND HUMAN WELL-BEING, Health Synthesis, Box 1.1 (World Health Organization 2005), available at <http://www.who.int/globalchange/ecosystems/ecosys.pdf> (“Modern, intensive farming practices in association with trade, travel and ecological change, are implicated in the emergence of diseases including BSE, foot-and-mouth disease and Nipah virus.”).

<sup>68</sup> See Rodriguez et al., *supra* note 60, at 435-36 (“Expansion of agriculture leads immediately to local losses of biodiversity through extirpation of local populations and loss of landscape diversity and, most important, loss of ecosystem services. These losses occur even if species extinctions do not or if extinctions are delayed due to the slow approach to equilibrium. A number of cascading effects result from the trade-off between land use and biodiversity. Perhaps the most important effects involve the unintentional impairment of supporting services, such as future soil formation, water purification capacity, or the maintenance of species habitat. Conversion of natural forests into croplands will also reduce ecosystem services such as climate regulation and carbon sequestration.”).

<sup>69</sup> INT’L INST. FOR SUSTAINABLE DEV., *supra* note 8, at 11 (“Deficiencies in some of these [ecosystem] elements or attributes can be augmented by technology through the use of fertilizers, irrigated water, high yielding seeds and domesticated animals over the short term and for long periods of time if managed sustainably.”).

<sup>70</sup> DAVID BATKER, A NEW VIEW OF OUR ECONOMY: NATURE’S VALUE IN THE SNOQUALMIE WATERSHED 19 (2010), available at <http://goo.gl/8xPCK> (“When water becomes polluted and natural systems are not available to filter it, it is possible to build a water filtration plant so that drinking water is still available. In many cases, however, built capital cannot replace natural capital. If a species becomes extinct, their genetic variance will be lost forever.”).

<sup>71</sup> This essay is primarily concerned with commercial, export-driven agricultural practices because of the scale of such practices, and to illustrate that the conclusions we draw have specific implications for export policies in developing countries. However, it is also widely acknowledged that subsistence agriculture is a major contributor to loss of ecosystem services and interference with ecosystem processes.

led to deforestation, pollution, and pressure on wildlife as a result of fishing and hunting.”<sup>72</sup> Cotton, another chief export crop in Africa, “puts considerable pressure on water resources, not only in terms of the pollution created by pesticides, but also because of the water requirements of the crop.”<sup>73</sup> Tea production commonly causes loss of habitat and biodiversity through deforestation for fuels and cultivation.<sup>74</sup> Natural capital in developing countries is particularly prone to the economic demands of international trade. In some cases, culpable agricultural practices become economically essential and irreversible. For instance, commercial and cash crop production account for sixty-five percent of Kenyan exports.<sup>75</sup> Cash crop production of coffee, tea, pyrethrum, flowers and cotton consumes 500,000 hectares of cultivated land in Kenya.<sup>76</sup> Horticulture, which rose as an industry in Kenya as recently as 1972, remains the fastest growing sector of the country’s economy.<sup>77</sup>

### *C. Agricultural Export Sector does not Internalize Impact on Ecosystem Services*

Most EDAEs have poor policy linkages between “government departments responsible for agriculture and trade.”<sup>78</sup> This linkage is even weaker between government departments responsible for trade and agriculture, on the one hand, and those responsible for environmental management, on the other. This policy incoherence is particularly striking given the dominance of agriculture in the economies of EDAEs. In other words, one would expect that given the potentially adverse effects of export agriculture on ecosystem services in EDAEs, there would be greater policy coherence between export-led agriculture and eco-system service management. For countries like Thailand that have a strong comparative advantage in some agricultural products, export-led agriculture is regarded as critically important to poverty reduction.<sup>79</sup> Thus agricultural growth and export performance are regarded as having

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<sup>72</sup> Michael Stockbridge, *Environmental Impacts*, ALL-AFRICA REVIEW OF EXPERIENCES WITH COMMERCIAL AGRICULTURE 1, 5 (2006), available at <http://goo.gl/ojN11>.

<sup>73</sup> *Id.* at 7.

<sup>74</sup> *Id.* at 6 (“Much of the land that is now planted with tea was once tropical forests.”).

<sup>75</sup> INT’L INST. FOR SUSTAINABLE DEV., *supra* note 8, at 12.

<sup>76</sup> *Aquastat, Kenya*, FAO’S INFO. SYS. ON WATER AND AGRIC., May 2006, <http://www.fao.org/ag/aglw/aquastat/countries/kenya/index.stm>.

<sup>77</sup> FAO, *A Thorn on Every Rose for Kenya’s Flower Industry*, NEWSROOM, Apr. 18, 2002, <http://www.fao.org/english/newsroom/news/2002/3789-en.html>.

<sup>78</sup> Ruffer et al., *supra* note 38, at 10. *See also id.* at 30 (discussing the “persistent conflicts between the positions of the Ministry of Commerce and the Ministry of Agriculture and Cooperatives,” in the Philippines).

<sup>79</sup> *Id.* at 35.

priority over the potential depletion of Thailand's natural capital by intensive agriculture.

Many developing countries including EDAEs have long regarded linking trade and the environment as a strategy of rich countries and transnational environmental groups to unilaterally exclude developing countries' imports for failing to meet developed country environmental standards.<sup>80</sup> Thus for many developing countries that rely on agriculture for export revenue, linking trade and the environment is regarded as overreach—an effort to globalize the values of industrialized countries that did not limit their own growth by the same stringent environmental standards and rules in the early stages of their development.<sup>81</sup>

Trade policy making in many countries heavily dependent on agriculture for exports tends to be undertaken without regard to environmental and ecosystem concerns. In effect, the narrow focus on intensive agricultural export activities tends to ignore the critical need to sustain functional ecosystems until ecosystem processes have been impaired.<sup>82</sup> As we noted above, trade policy makers are often committed to generating increased exports and export returns, and rarely formulate trade policies in conjunction with environmental authorities as a result.<sup>83</sup> Thus, where trade policies in export-dependent countries

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<sup>80</sup> See LISELOTTE ISAKSSON & COLIN MOORCRAFT, *STRIKING A GREEN DEAL: EUROPE'S ROLE IN ENVIRONMENT & SOUTH-NORTH RELATIONS* (1993); PEIDER KONZ, *TRADE, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT: VIEWS FROM SUB-SAHARAN AFRICA AND LATIN AMERICA* (2000). See also GRAHAM CHAPMAN ET AL., *ENVIRONMENTALISM AND THE MASS MEDIA: THE NORTH-SOUTH DIVIDE* (1997); B.S. Chimni, *WTO and Environment: Shrimp-Turtle and EC-Hormone Cases*, 35 *ECON. POL. WKLY.* 1752 (2000); BNA, *Developing Countries Resist Expansion of Environment Role for World Trade Body*, *INT'L ENV'T'L REP.* 224 (Mar. 17, 1999).

<sup>81</sup> See Vandana Shiva, *The Greening of Global Reach*, 22 *ECOLOGIST* 258, 258-59 (1992).

<sup>82</sup> The problems relating to desertification and land degradation are in part a reflection of the fact that intensive agricultural practices such as those relating to flower farming in Kenya deplete the natural capital which in turn contributes to unavailability of water in drier parts of the country. The destruction of the Mau Forest water catchment area exemplifies how intensive uses of agricultural land have resulted in ecosystem wide consequences.

<sup>83</sup> Thus incentives to generate a horticultural and floricultural sector in countries like Kenya and Ethiopia have directly influenced intensive water use and fertilizer inputs in ways that adversely affected water quality and the ability of water uses for other purposes – including subsistence agriculture and industry, recreation, hydro-electric power, and drinking water for major urban areas. See generally Jacqueline M. Klopp and Kipkosgei Sang, *Maps, Power and the Destruction of the Mau Forest in Kenya*, 12.1 *GEORGETOWN JOURNAL OF INTERNATIONAL AFFAIRS* (2011). This overuse of common pool resources such as water is a reflection of at least three problems: first, there is an extremely large number of dispersed users of these resources who have no incentive to exercise restraint or otherwise avoid overexploitation of the resource and no reason to conserve for the future; second, the extraction of the resource by these users results in sub-optimal outcomes from the group's perspective, third, common pool resources suffer the absence of a collective resource management strategy or management structure. See generally ELINOR OSTROM, *GOVERNING THE COMMONS: EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION*, 29-32 (1990).

are not specifically aimed at protecting ecosystems, they are likely to allow or even encourage short-term economic gains over long-term ecosystem value.

In Kenya, the National Committee on the World Trade Organization (NCWTO) coordinates WTO issues in the government. The committee has representatives from various government ministries as well as from the private sector, academia, and civil society. Although the NCWTO has a broad mandate including the study and analysis of how the provisions of WTO agreements are likely to affect the Kenyan economy, it has not conducted any studies on the impact of the country's trade policy on the ecosystem.<sup>84</sup> However, there is a Trade and Environment subcommittee in the NCWTO, chaired by the National Environmental Management Authority (NEMA). In spite of this, there is no evidence that the policy dialogue has included ecosystem services. The NCWTO is severely constrained since its existence is not established by statute and its funding comes primarily from donors rather than the government. Nevertheless, its major accomplishments have been in generating country positions and statements ahead of major WTO negotiations and not in analyzing the impact of trade on the country's natural capital. Further, Kenya's trade governance is severely handicapped by fragmentation. While the NCWTO coordinates global trade negotiations under the Ministry of Trade, the Ministry of the East African Community coordinates regional trade. Another department within the Ministry of Trade, Kenya Post Lome Trade (KEPLOTRADE) handles negotiations with the European Union. While the NCWTO has a sub-committee on trade and the environment, there is no mirror body within KEPLOTRADE or the Ministry of East African Community.<sup>85</sup>

On the whole there is a significant lack of public information about how the Kenyan government formulates its trade policy. Civil society involvement is ad hoc. Civil society groups have at times had to sue the government to have the government pay attention to their concerns

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<sup>84</sup> For more on this, see Njuguna Ng'ethe and Jacob Omolo, *Kenya, in* GOVERNMENTS, NON-STATE ACTORS AND TRADE POLICY MAKING: NEGOTIATING PREFERENTIALLY OR MULTILATERALLY? 214, 227-47 (Ann Capling and Patrick Low, eds, 2010).

<sup>85</sup> KEPLOTRADE has developed a structure that clusters the negotiation areas into six sectoral areas: market access, agriculture, services, trade related issues, fisheries, and development. Like the NCWTO, it has a mandate to "provide in depth analytical studies and policy advice on matters pertaining to Kenya-EU trade relations." See generally European Commission, A NEW APPROACH IN THE RELATIONS BETWEEN EUROPEAN UNION AND EASTERN AND SOUTHERN AFRICA COUNTRIES 13 (2006), available at [http://trade.ec.europa.eu/doclib/docs/2006/february/tradoc\\_127347.pdf](http://trade.ec.europa.eu/doclib/docs/2006/february/tradoc_127347.pdf).

about the direction of trade policy.<sup>86</sup> In this context, the place of environmental concerns within trade policy is virtually nonexistent. Thus, although Kenya now has a revitalized environmental legal and policy framework, trade and environmental policymaking have been bifurcated.<sup>87</sup> Environmental quality is subservient to increased growth and eradication of poverty in the process of development planning, policy formulation and implementation. While the National Environmental Management Authority (NEMA), has prioritized the need to harmonize effective management of water catchment areas in relation to agriculture, water resources, forests and wetlands,<sup>88</sup> no explicit links or references are made regarding the impacts of agricultural export production on ecosystem services. In fact, the driving purpose behind the NEMA's annual state of the environment report is to position the environment for its use in realizing the country's declared economic policy (to be a middle income country by 2030), rather than to examine how policies such as those intended to promote agricultural exports to produce foreign exchange, economic growth, and reduced poverty may be adversely impacting on Kenya's natural capital.<sup>89</sup>

Not all countries follow Kenya and fail to make explicit links between trade and the environment as part of their trade strategy. The United States Congress in the Trade Act of 2002 established a negotiating mandate under which the negotiation of any future trade agreements is required to "ensure that trade and environmental policies are mutually supportive" and that they "seek to protect and preserve the environment and enhance the international means of doing so."<sup>90</sup> These

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<sup>86</sup> M. Agutu, *Lobby Files Suit to Stop EU Pact*, DAILY NATION, Oct. 27, 2007, available at <http://allafrica.com/stories/200710260081.html>

<sup>87</sup> The National Environmental Management Authority (NEMA) publishes an annual state of the environment report that does not address the linkages between agriculture and export trade. See, e.g., NEMA, KENYA: STATE OF THE ENVIRONMENT AND OUTLOOK 2010 (2011), [http://www.nema.go.ke/index.php?option=com\\_docman&task=cat\\_view&gid=356&Itemid=35](http://www.nema.go.ke/index.php?option=com_docman&task=cat_view&gid=356&Itemid=35).

<sup>88</sup> *Id.* at 30.

<sup>89</sup> In the United States, litigation against government agencies to keep them faithful in their environmental protection mandates is frequent. See, e.g., *Natural Res. Def. Council v. U.S. Env'tl. Prot. Agency*, 464 F.3d 1 (2006) (an unsuccessful suit against the EPA for exempting large amounts of an ozone depleting substance from elimination under decisions made under the Montreal Protocol).

<sup>90</sup> 19 U.S.C.A. § 3802(a)(5) (2004). Section 3802(a)(6) requires a respect for and an "understanding of the relationship between trade and worker rights." Notably, the AFL-CIO opposed the Act because it did not require the president to include enforceable protections for the environment and workers' rights in trade agreements. See AFL-CIO, *John J. Sweeney, President, AFL-CIO - Senate Finance Committee - Proposed Fast Track Legislation*, (June 20, 2001), available at <http://www.aflcio.org/Press-Room/Press-Releases/Statement-by-AFL-CIO-President-John-J.-Sweeney-Urg2>. In addition, the Sierra Club criticized the Act because it failed to encourage environmental protection and as well as guarding against weakening of

provisions of the 2002 Trade Act came after years of intensive lobbying and litigation regarding the insensitivity of trade agreements to the environment. Groups and individuals interested in ensuring the U.S. government considers environmental impacts of trade agreements now have a basis to lobby the government to avoid irreversible damage to the nation's natural capital. Countries like Kenya would do very well to consider a negotiating mandate similar to that of the United States. Of course, in the absence of a valuation of ecosystem services and natural capital, EDEAs might view such a mandate as an unaffordable luxury.

### III. INTEGRATING ECOSYSTEM SERVICES INSIGHTS INTO TRADE POLICIES OF EXPORT-DRIVEN AGRICULTURE

Promoting sustainable agricultural trade policies in developing nations faces the politically challenging dilemma of prioritization: all wealth generated must involve, at some level, a tradeoff between competing needs in ecosystem services.<sup>91</sup> Ecosystem tradeoffs can be quite complex, given that each alternative presents both benefits to human well-being and significant ecosystem costs. One fundamental problem in agricultural practices is the task of maintaining a consistent supply of clean water while satisfying the need for food production:

Greater use of the world's water supply for agricultural production may improve basic food production and human health in many places. However, increases in pollution and water shortages caused by more-intensive agriculture may make many of these regions more vulnerable to surprises, such as drought, eutrophication, or floods that overwhelm sewage treatment plants. One unexpected consequence of agricultural intensification and climate change is that many rivers will have higher discharge rates, becoming more prone to flooding and drying, with few big differences between scenarios. Many areas that are already water-limited will face further water availability stress and will be more susceptible to environmental perturbations such as drought. These

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environmental standards." See Sierra Club, *Responsible Trade: Oppose H.R. 3005, the Trade Promotion Authority Act of 2001: A letter from 12 Environmental Groups* (Oct, 16, 2001), available at <http://goo.gl/vCMIR>. According to the Sierra Club the Act also fails to "provide sufficient assurances to Congress that the administration will bring back trade and investment agreements that meet congressional negotiating objectives to safeguard the environment" because it only includes "voluntary negotiating objectives on the environment." In addition, unlike the Jordan Free Trade Agreement and NAFTA, Sierra Club criticized the Act for doing nothing "to prevent countries from lowering their environmental standards to gain unfair trade advantages, and fails to actively promote meaningful improvement in environmental protection and cooperation." *Id.*

<sup>91</sup> See Rodriguez et al., *supra* note 60, at 443 ("[R]eal-world examples support the contention that managers must make trade-offs that explicitly or implicitly lead to preferences among ecosystem services.").

regions may find themselves facing water shortages or water that is undrinkable.<sup>92</sup>

The situation is exacerbated by greater uncertainties in the context of climate change scenarios and an increasingly unsustainable population.<sup>93</sup> Even more challenging is the loss of supporting services, such as biodiversity, climate regulation, and carbon sequestration. The loss of a supporting service “does not often have immediate consequences. However, the slow degradation of supporting services makes it very hard for future policy-makers to reverse the trend in biodiversity loss.”<sup>94</sup>

Expansion of agricultural productivity will be a continuing response to increasing populations and an adaptation to climate change uncertainties. As such, the expansion of commercial agriculture will continue to play a central role in the loss of a variety of ecosystem services.<sup>95</sup> Although the diffusion of technology may offer opportunities in many cases to manage certain ecosystem threats, appropriate technologies may not always be available.<sup>96</sup>

Protecting a country’s capital assets requires an understanding how uses of natural capital are linked to the economy and to human well-being. As recently noted by UNEP, “[I]t is possible to feed everyone without massive and irreversible damage to our ecosystems—damage that would ultimately endanger both water and food security in the future. The knowledge is there, if only we can make the necessary changes to act on it.”<sup>97</sup> Trade policy makers need to understand the impact of trade policies on the ecosystem. Ecosystem services valuation provides significant insights into possible directions for trade policies. The importance of highlighting the impact of export-driven agriculture through the lens of ecosystem services exists in establishing

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<sup>92</sup> See *id.* at 435.

<sup>93</sup> Most models suggest that increases in total agricultural production lead to the expansion of irrigated farmland, increased water stress, and increases in the volume of polluted water. See *id.*

<sup>94</sup> See *id.* at 435-36.

<sup>95</sup> See generally MILLENNIUM ECOSYSTEM ASSESSMENT: ECOSYSTEMS AND HUMAN WELL-BEING, *supra* note 1, at 13.

<sup>96</sup> *Id.* (“In many cases, appropriate technologies already exist that could be applied more widely, but countries lack the financial resources and institutional capabilities to gain and use these technologies. Where agriculture already dominates landscapes, the maintenance of biodiversity within these areas is an important component of total biodiversity conservation efforts, and, if managed appropriately, can also contribute to agricultural productivity and sustainability through the ecosystem services that biodiversity provides (such as through pest control, pollination, soil fertility, protection of water courses against soil erosion, and the removal of excessive nutrients.”).

<sup>97</sup> UNITED NATIONS ENVIRONMENT PROGRAMME AND INT’L WATER MANAGEMENT INST., SYNTHESIS REPORT: AN ECOSYSTEM SERVICES APPROACH TO WATER AND FOOD SECURITY 12 (2011), available at <http://www.iwmi.cgiar.org/Topics/Ecosystems/>.

the link between ecosystem services and human well-being. Trade policies that ignore or displace ecosystem services constitute a direct assault on the well-being of local populations. This has been the case with the depletion of the Mau forest through intensive farming in Kenya that has in turn led to acute water shortages in Nairobi, the largest urban area in that country.<sup>98</sup> Agricultural reforms that address sustainable development, as well as export policies in developing countries, must account for the continuing receipt of the benefits from functioning ecosystems.

Evidence is already mounting in favor of ecosystem services integration into economic policy making and implementation. Recent research suggests that the incorporation of ecosystem functionality into agricultural practices may be an effective tool in the pursuit of sustainable agricultural production.<sup>99</sup> The ecosystem services approach “expand[s] the breadth of landscapes upon which conservation efforts are employed, particularly on agricultural landscapes where new stakeholders are engaged in sustainable land-use practices.”<sup>100</sup> In the meantime, ecosystem services projects have sparked the interest of new partners and partnerships.<sup>101</sup> Under these circumstances, creating a culture of sustainable agriculture will depend on the integration of ecosystem services into farming practices and generation of sustainable alternatives:<sup>102</sup> the goal is “to insure that society benefits not only from

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<sup>98</sup> Environmental News Service, *Kenya Seeks Millions to Save Mau Forest, Avert Water Crisis*, ENS NEWSWIRE, Sept. 14, 2009, <http://www.ens-newswire.com/ens/sep2009/2009-09-14-01.asp>; see also John Mbaria, “Plan to conserve waters of Lake Naivasha,” September 4, 2011 (discussing how overdraft of ground and surface waters “led to severe reduction in the water flowing on the rivers feeding into Lake Naivasha and to shrinking of the lake itself”), available at <http://www.nation.co.ke/oped/Opinion/Plan+to+conserve+waters+of+Lake+Naivasha+/-/440808/1230168/-/d240nb/-/index.html>.

<sup>99</sup> MILLENNIUM ECOSYSTEM ASSESSMENT: ECOSYSTEMS AND HUMAN WELL-BEING, *supra* note 1, at 30 (“Another pathway through which biodiversity can improve food security is the adoption of farming practices that maintain and make use of agricultural biodiversity. Biodiversity is important to maintaining agricultural production. Wild relatives of domestic crops provide genetic variability that can be crucial for overcoming outbreaks of pests and pathogens and new environmental stresses. Many agricultural communities consider increased local diversity a critical factor for the long-term productivity and viability of their agricultural systems. For example, interweaving multiple varieties of rice in the same paddy has been shown to increase productivity by lowering the loss from pests and pathogens.”).

<sup>100</sup> Rebecca L. Goldman and Heather Tallis, *A Critical Analysis of Ecosystem Services as a Tool in Conservation Projects: The Possible Perils, the Promises, and the Partnerships*, 1162 THE YEAR IN ECOLOGY AND CONSERVATION BIOLOGY 63, 75 (2009) (analyzing the differences and overlap between conservation projects focused on biodiversity and those driven by ecosystem services).

<sup>101</sup> *Id.*

<sup>102</sup> Mahendra Shah, et al., *Food and Ecosystems*, in MILLENNIUM ECOSYSTEM ASSESSMENT: ECOSYSTEMS AND HUMAN WELL-BEING, POLICY RESPONSES 173, 194 (2005), available at <http://www.millenniumassessment.org/en/Responses.html#download> (“The dramatic increase in

the production of food and fiber but also from the maintenance or restoration of ecosystem services such as watershed protection, healthy soil and the biodiversity that depends on both."<sup>103</sup>

Most of the literature addressing the integration of ecosystem services values into governance emphasizes the importance of collaborative and stakeholder-driven governance, institutional valuation of ecosystem processes, and accountability.<sup>104</sup> The maintenance of ecosystem service values begins with an inventory of ecosystem services and their benefits. Information and education on ecosystem services is generally seen as a necessary component for improving farming practices in developing countries.<sup>105</sup> By understanding the manner in which ecosystem services sustain life and human well-being, communities will be better able to understand the value in protecting ecosystem processes. Hopefully, their understanding will drive them to take part in retaining the continuing benefits of ecosystem services, rather than exporting ecosystem goods produced at the expense of ecosystem functionality.

Re-orienting export led agriculture to become sustainable agriculture is challenging because the value accrued through functioning ecosystems does not obviously further the interests of export-driven agriculture.<sup>106</sup> This is particularly true because the valuation of

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the use of agrochemicals in developing countries in recent decades and concentration on cash crops has often resulted in environmental contamination, severe health problems, and unprofitable crop production. The need for changes has resulted in a need for alternatives: crop production systems which do not rely heavily on chemical inputs, but which nevertheless produce economically viable yields while minimizing environmental impacts. Integrated pest management is one such system that has been successfully implemented on a wide range of crops and agroclimatic zones.”)

<sup>103</sup> CLAY, *supra* note 7, at 2.

<sup>104</sup> See J.B. Ruhl, et al., *Proposal for a Model State Watershed Management Act*, 33 ENVTL. L. 929, 931-32 (2003); Heal, ET AL., *supra* note 2.

<sup>105</sup> See, e.g., J.M. Mironga, *Effect of Farming Practices on Wetlands of Kisii District, Kenya*, 3 APPLIED ECOLOGY AND ENVTL. RESEARCH 81 (2005) (noting that farmers operating in or near wetlands tended to have less awareness of and appreciation for wetlands).

<sup>106</sup> Environmental protection is often seen as an unwanted burden for economic security, particularly in regions that are already challenged by global market competition, inadequately capitalized subsistence and local farming operations, and the continuing consequences of widespread poverty. It has been suggested that the liberalization of trade will provide some relief to ecosystem health through market-based mechanisms. MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: OPPORTUNITIES AND CHALLENGES FOR BUSINESS AND INDUSTRY, 18 (2005) (“Cultivated” versus “wild” services “sectors of the global economy are in major transition from reliance on ecosystem services provided in ‘the wild’ to those provided through farming. For example, nearly one third of the fish and timber supplied to markets comes from farming. However, farming brings new sets of environmental concerns and impacts on ecosystems. For example, carnivorous fish such as salmon are fed fishmeal, which is made from wild caught fish. As the farming of carnivorous fishes grows, care must be taken that doing so does not further deplete wild populations. Sustainable aquaculture will also minimize

ecosystem services often suffers from the inability to understand future or geographically distinct value,<sup>107</sup> and as such, “[i]n many instances, society chooses to trade off supporting services or regulating services in favor of short-term provisioning ecosystem services.”<sup>108</sup> Of course, in many cases, farming interests may not align with activities intended to maintain ecosystem processes because of a perceived lack of a direct benefit.<sup>109</sup> Even for the beneficiaries of ecosystem services, it is easy to underestimate the character and extent of social and environmental externalities suffered in developing countries from export-driven agriculture, especially where the immediate gains are so important to a locality’s or nation’s gross wealth<sup>110</sup> and are promoted in international arenas as viable development strategies.<sup>111</sup> The critical point to see is that export-driven trade policies effectively prevent developing

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nutrient and chemical pollution, escapees, and disease. Increasing consumer awareness of these issues is bringing pressure to bear on the aquaculture industry, favoring companies with more sustainable practices and policies.”). However, it may be neither clear nor reasonable to believe that consumer choices will be sufficient to reverse ecosystem degradation in developing countries.

<sup>107</sup> See Rodriguez et al., *supra* note 60, at 443-44 (discussing the difficulties in valuing services that are geographically or temporally distant).

<sup>108</sup> *Id.* at 443. (“[M]anagement choices tend to increase the supply of services that are perceived by society as more important – provisioning and regulating services – and thus do not fully value tradeoffs of cultural and supporting services. In addition, supporting services are more likely to be ‘taken for granted.’”).

<sup>109</sup> For instance, hypoxia in the Gulf of Mexico is attributed in large part to nitrogen loads in agricultural runoff to the Mississippi River. Reducing nitrogen fertilizers in upstream farming operations to improve ecosystem productivity in the Gulf of Mexico may have no perceptible benefit to those farmers. For these farmers, it may be irrelevant that fertilizers impair the long-term ability of soils to provide particular services: “Synthetic fertilizers can reduce the ability of soil to produce or make nutrients available to plants. The application of concentrated forms of nitrogen by farmers reduces the activity of nitrogen-fixing bacteria in the soil, and it increases the populations of other organisms that feed on nitrogen.” CLAY, *supra* note 7, at 50; see also David Tilman, et al., *Agricultural Sustainability and Intensive Production Practices*, 418 NATURE 671, 675 (2002) (“Although some ecosystem services, such as pollination or control of agricultural pests, are of direct benefit to a farmer, other ecosystem services may benefit the public as a whole but be of little or no direct benefit to the farmer.”).

<sup>110</sup> See Carmen G. Gonzalez, *An Environmental Justice Critique of Comparative Advantage: Indigenous Peoples, Trade Policy, and the Mexican Neoliberal Economic Reforms*, 32 U. PA. J. INT. L. 723, 770 (2011) (arguing that, in a case study of corn production in Mexico, “the market price for U.S. corn did not take into account the significant environmental consequences of monocultural corn production, including soil erosion, increased agrochemical use, water pollution due to pesticide and fertilizer runoff, and depletion of aquifers used for irrigation; conversely, the market price for Mexican corn failed to reflect the social and environmental benefits of traditional corn cultivation, including the protection of biodiversity and the well-being of Mexico’s indigenous farming communities.”).

<sup>111</sup> *Id.* at 739-740 (“World Bank analysts have advocated agro-export specialization as a viable development strategy provided that the ‘playing field’ is ‘leveled’ by reducing and eventually eliminating tariffs and import barriers.”).

countries from implementing a linkage between comparative advantage and natural capital wealth.<sup>112</sup>

#### CONCLUSION

It is important to recognize that the ecosystem services valuation informs, rather than dictates policy choices.<sup>113</sup> An ecosystem services value will often suggest a particular allocation of burdens and benefits and as such, will be subject to resistance. Yet the ecosystem services approach yields value by accounting for natural capital and the conditions where ecosystems help to facilitate agriculture, whether for export or subsistence. More importantly, attention to the value of ecosystem services will provide crucial insights into whether export-driven agricultural policies, and the agricultural practices that are often driven by such policies, result in a net gain or loss in domestic wealth and well-being.

This essay has argued that the integration of ecosystem services into governmental policy- and decision-making processes is essential, particularly in economies that are heavily dependent on agriculture for exports. The ecosystem services approach changes the tone of asset management by capturing the value of these previously ignored ecosystem functions so there is no tradeoff between ecosystem services and production of economic growth through exports. Such a tradeoff can be avoided by ensuring the demands of export-led or intensive agriculture do not over-exploit ecosystem services or habitat and biodiversity loss. Ultimately, it is our view that integrating ecosystem service-planning and protection into economic, and in particular trade, policy making and implementation through practices such as sustainable agricultural production is likely to augur well for economic growth

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<sup>112</sup> Although the focus of this essay is to align export policies in developing countries with mechanisms to retain ecosystem service benefits at home by integrating ecosystem service value into the policy matrix, one potential solution to the problem of understanding and awareness of the necessity for ecosystem services is to establish a system of financial accountability for ecosystem processes. Payments for Ecosystem Services (PES) programs are emerging in countries around the world to create markets-based interests in greenhouse gases, watersheds and watershed features, water, and even biodiversity. PES programs typically result in public and private investment in ecological processes by establishing economic value and allocating tradable units in ecosystems. See FAO, *THE STATE OF FOOD AND AGRICULTURE: PAYING FARMERS FOR ENVIRONMENTAL SERVICES*, 2007.

<sup>113</sup> Zhang et al., *supra* note 50, at 259 (“But merely stating the economic value of a given service or set of services does not create incentives to maintain it. Policies will typically be required to create markets for currently non-marketed ES or to compensate people whose ecosystem management provides beneficial externalities to others, internalizing ES value into land management decisions.”).

through exports, as well as the long-term sustainability of ecosystem services.