

Book Review

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The Economics of Ecosystems and Biodiversity. (2018a).

Measuring what matters in agriculture and food systems: A synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report.

Geneva, Switzerland: UN Environment. 42 pp.

<http://teebweb.org/agrifood/measuring-what-matters-in-agriculture-and-food-systems/>

The Economics of Ecosystems and Biodiversity. (2018b).

TEEB for agriculture & food: Scientific and economic foundations.

Geneva, Switzerland: UN Environment. 74 pp. ISBN 978-92-807-3702-8.

<http://teebweb.org/agrifood/scientific-and-economic-foundations-report/>

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Don't be misled or put off by these titles. I know, I know, these sound like narrowly specialized technical works. But to aid you in deciding whether a review of these publications is relevant to you, let me open with this spoiler alert conclusion: The Economics of Ecosystems and Biodiversity (TEEB) likely constitutes the most advanced, state-of-the-art model for comprehensive systems evaluation that exists—a multidimensional, integrated, systems-based, and complexity-informed approach. If widely applied, this just might be the framework and set of methods that open the pathway to evaluation helping address global challenges of sustainability and equity. These publications apply TEEB to food and agriculture, but the framework can be applied to any endeavor that affects humans and the environment. If that includes your arena of interest and expertise, read on. If it doesn't, what in the world are you up to? Just asking.

Let's begin with some framing questions.

Do you know what it actually costs to grow the food you eat? To get it to you? To deal with the waste you create? What costs should be included in such calculations? Should costs and benefits to your health, the environment, and the community be considered? Can they be measured?

True cost accounting is a method for measuring all costs and benefits of a system, like a food system (Food and Agriculture Organization, 2017). A related approach is called *full cost accounting*, which emphasizes including opportunity costs: “the value of opportunities that are given up when a choice is made to use a limited resource for a specific purpose” (Carter, Perruso, & Lee, 2001, p. 2). Now, we have TEEB, a comprehensive evaluation framework for doing true and full cost accounting of systems by integrating economic, social, and ecological dimensions and factors through a multi-dimensional systems approach. Applying TEEB to food systems is designated as TEEBAgriFood, which yielded the publications being reviewed here. TEEBAgriFood requires identifying, making transparent, and quantifying, when possible, all costs of food across the value chain: production, processing, and consumption. Such calculations include the prices farmers receive, the affordability of food for consumers, and “externalities” like impacts on the environment and human health.

Published on World Environment Day, June 5, 2018, TEEBAgriFood was developed and tested over several years at a cost of several million dollars. The TEEBAgriFood initiative is hosted by UN

Environment and coordinated by the TEEB Office in Geneva, Switzerland. It encompasses multiple research and capacity-building projects focusing on the holistic evaluation of agriculture and food systems along their value chains, including their most significant externalities, both positive (e.g., equitable distribution) and negative (e.g., environmental degradation). The work is supported by the Global Alliance for the Future of Food, a collaboration of 23 philanthropic foundations, for which I serve as developmental evaluator (www.futureoffood.org). I participated in an advisory group for TEEBAgriFood, which is how I came to learn about it in depth. I watched the design unfold, skeptical about whether it would ever come to fruition. Once designed, it seemed far too complicated to ever be implemented. It has been and is being implemented. The initial set of results are out.

The findings debunk the claim that industrial food production is cheap. Yes, the food is relatively cheap, but the full and true costs to human and environmental health are expensive. The common, production-only focus of assessment, using metrics of yield per acre, ignores the significant range of social and environmental impacts that must be included for a complete evaluation. Comparing true and full costs becomes especially important when considering policies that affect industrial versus organic agriculture and other forms of alternative production, as well as policies that have an impact on transportation, marketing, pricing, and other aspects of food systems subject to regulation, intervention, and comparison.

Two volumes are being reviewed here. *Measuring What Matters in Agriculture and Food Systems* presents actual evaluation results from applications of TEEB. The companion volume, *TEEB for Agriculture & Food: Scientific and Economic Foundation*, presents the theory, methods, and measurements of this approach to true and full cost accounting. I offer this overview of TEEBAgriFood, at some length, in hopes of stimulating you to examine it for yourself. This is evaluation on a global scale with implications for the future of food, which means implications for the future of humanity and the Earth. Moreover, the theory and methods of true cost accounting are applicable to any situation where alternative approaches are in competition. Here are three examples where true cost accounting could and should inform the public policy debate: (1) fossil fuels versus renewable energy, (2) incarceration of nonviolent offenders versus nonprison, community-based diversion models, and (3) public mass transit versus subsidizing individual car ownership. As you read this review, I invite you to contemplate applications in your own area of evaluation specialization. (A manual for applying TEEB to urban management is not included in this review; see Mader, Patrikson, Calcaterra, & Smit, 2011, as a different application.)

Let me add that true cost accounting is more than, and different from, traditional cost-benefit analysis. Evaluators are familiar with cost-benefit and cost-effectiveness analyses applied to projects and programs (e.g., Levin & McEwan, 2001). A critique of program-focused cost-benefit calculations is that they treat the program as a closed system and don't examine larger contextual costs and benefits, that is, they limit costs to direct inputs and only measure benefits of directly attributable outcomes. True cost accounting expands the boundaries of what is included in the analysis by identifying, examining, and calculating societal costs and benefits. This means, for example, including the benefits of renewable inputs and the long-term costs to society and the environment of outcomes produced with nonrenewable resources. The significance of these differences will become clearer as this review unfolds. First, let's begin with some context.

The Global Baseline

The TEEBAgriFood evaluation report provides a mountain of evidence that "today's agriculture and food systems are broken: our diets have now become the main burden of disease, more than 815 million suffer from hunger, over 650 million suffer from obesity, and malnutrition affects over two billion" (Müller & Sukhdev, 2018, p. 1) TEEBAgriFood examines "the full value chain of food" including deforestation to clear land, processing, packaging, transportation, waste, and contributions

to climate change: “our food systems account for an estimated 43-57 per cent of human-caused greenhouse gas emissions” (Müller & Sukhdev, 2018, p. 1).

Despite the centrality of food to human well-being, the prevalent metrics for food system performance fail to capture the multidimensional complexity and far-reaching impacts of inadequate, wasteful, and high true-cost food systems. Simply focusing on the amount of food produced, the costs of production, and calories consumed ignores environmental costs, systematic inequities in distribution and consumption, and effects on individual and community health. TEEBAgriFood addresses these inadequacies by including in evaluation of agriculture and food systems an understanding of the complexities of interdependent ecosystems. This means examining the effects of food production on agricultural lands, pastures, and inland fisheries. It means calculating the costs of labor, infrastructure, technology, policies, regulations, and institutions, including costs involved in making policies, framing regulations, and providing markets. TEEBAgriFood attends to cultures and traditions that are involved in growing, processing, distributing, and consuming food. “Evaluating such complexity with (for example) a yardstick as narrow as ‘per hectare productivity’ of a single crop might appear naïve, and yet, exactly such dangerous simplification infects the dominant discourse on food systems” (Müller & Sukhdev, 2018, p. 1). The alternative to monitoring siloed indicators is complex systems evaluation.

Evaluating Complex Systems

One of the major developments in the field of evaluation in the last decade has been the incorporation of systems thinking and complexity concepts into evaluation designs. This perspective addresses a system as the evaluand, and changes in systems can be the focus of evaluation (Patton, 2011). The Systems in Evaluation Topical Interest Group (2018) of the American Evaluation Association has been engaged in identifying principles for systems evaluation. Several publications offer guidance on systems evaluation (Patton, 2018; Williams, 2005, 2008; Williams & Hummelbrunner, 2011; Williams & Iman, 2006). But the existing literature on evaluating systems is fairly narrow in focus, being constrained by project and program boundaries or relatively small-scale systems change initiatives. The systems approach adopted by TEEBAgriFood looks along *entire food production and consumption chains* and across levels from farm families to farming communities to regional agroecological systems to global food production and consumption patterns and dynamics.

In so doing, this comprehensive systems analysis reveals that there are significant stocks and flows that make a huge difference in calculating true costs but are not incorporated in macro-economic modeling or the calculus of gross domestic product. Stocks and flows include land availability, soil quality and erosion, sources and availability of seeds, market regulations, storage facilities, labor needs, and transportation, to name but a few examples. These stocks and flows are essentially invisible in narrow cost-benefit analyses because they are outside market-based exchanges. The TEEBAgriFood analysis shows that these multiple inputs into production and the effects on the environment can be observed, described, and measured. Over the course of a decade, TEEBAgriFood research has focused on the economic invisibility of the costs of biodiversity loss and the degradation of ecosystems, findings that take on special significance when considering that no economic sector is more reliant on healthy, well-functioning, and sustainable ecosystems than the agriculture sector.

Thus, the TEEB evaluation framework includes attention to important interconnections and interrelationships with other systems like water availability, human health, social equity, gender dynamics, sustainable livelihoods, climate change, and ecosystems’ biodiversity. In this regard, TEEBAgriFood has been designed to provide a comprehensive economic evaluation of the *eco-agri-food systems complex*. This term encompasses the vast, dynamic, and interacting complex

of distinct but interconnected ecological, economic, and sociocultural subsystems that are crucial in growing, processing, distributing, and consuming food. Specific TEEBAgriFood evaluations of specific agroecological systems have demonstrated the significant conclusion that the economic environment in which farmers operate involves significantly distorted incentives and disincentives related to both negative and positive externalities. To understand these complex interactions, TEEBAgriFood adopted a complex systems approach because it is neither possible nor informative to isolate impacts and dependencies of primary agricultural production within a farming system (collection of farmers within an ecosystem). These subsystems are interconnected in the eco-agri-food system. Examining these subsystems in relation to each other is the pathway to understanding and advancing truly sustainable and equitable solutions to the agri-food challenges the world faces.

TEEBAgriFood analysis provides insights into the diversity of agriculture and food systems, each with different contributions to global food security (and insecurity), impacts on the natural resource base, and ways of working through food system supply chains. The synthesis evaluation report describes pathways of sustainability by aligning with, rather than against, natural ecosystem processes. Making agricultural and food systems more sustainable and equitable poses challenges for farmers, communities, and societies because it means transforming food value chains to build resilience into eco-agri-food systems. A simple but illustrative example is using natural biomass in food production instead of chemical fertilizers, given that heavy use of artificial inputs has negative long-term effects on human health, soil fertility, watersheds, and sustainability. Human health, diets, and nutrition, often omitted from closed system food production cost-benefit analyses, are incorporated in the TEEBAgriFood framework.

Sustainability and Equity: A Sense of Urgency

The synthesis evaluation report concludes that there is an urgent need to transform our global food system to one in which the health of humans, ecosystems, and communities is prioritized—and the results evaluated using a broad framework such as TEEB. The sense of urgency derives from the increasingly visible effects of climate change, watershed degradation, soil losses, severe weather intensification, and demographic shifts, all of which, in combination, increase the challenge of growing sufficient food, sustainably, for a growing global population. Furthermore, analyses of social equity, ethics, and justice, also traditionally missing from agricultural cost-benefit analyses, allow attending to ethical issues related to hunger, sustainability, human rights, safety, marketing, trade, diets, and animal welfare, among others.

Thus, TEEB is based on explicit values of sustainability and equity. This means TEEB can be used to evaluate how food systems affect equity from production to consumption to food waste management. In an equitable food system, everyone has access to healthy food and the benefits and burdens of the food system are equitably distributed. The recommendations that flow from the TEEBAgriFood synthesis advocate policies that ensure poor people's access to land, natural resources, technologies, markets, rights, and gender equality. TEEB asserts that social equity, justice, and ethical considerations should be fundamental values of our food system.

In so advocating, the TEEBAgriFood Evaluation Framework establishes *what should be evaluated* and positions this framework as the next generation in assessment tools for eco-agri-food systems. The framework supports the use of monetary and nonmonetary approaches to impact assessment. As a comprehensive and universal framework, it highlights all relevant dimensions and drives policy makers, researchers, and businesses to broaden their information set for decision-making. The market and nonmarket valuation tools and methods examine both positive and negative externalities in all aspects of eco-agri-food systems. TEEBAgriFood urges policy makers, regulators, consumers, and evaluators to integrate economic values with other social, environmental, and cultural dimensions.

The TEEB (2018b, chapter 8) report of evaluation results showcases 10 case studies that use the TEEBAgriFood evaluation framework to focus on various aspects of the value chain: agricultural management systems, business analysis, dietary comparison, policy evaluation, and national accounts for the agriculture and food sector. The case studies have helped identify opportunities to expand particular aspects of the framework for comparisons as well as to introduce spatial and temporal contexts. The TEEBAgriFood theory of change aspires to show how adopting the evaluation framework can bridge the gap between knowledge and action and between theory and practice.

Evaluators will find in TEEB a stakeholder-responsive framework. The framework addresses the critical role of power relations in food systems. The TEEBAgriFood report uses experience in food certification and multistakeholder roundtables to advocate for involving key actors and relevant groups, including farmers, government, industry, and consumers, in designs, analyses, and action agendas based on TEEB. The evaluation framework concludes with the need for transformations of the global eco-agri-food system and asserts that achieving needed changes will depend on alliances for change among diverse stakeholders. Therefore, the approach situates TEEBAgriFood in the normative framework provided by the Right to Food global initiative and relates it to other values-based food transformation initiatives (Hussain & Vause, 2018).

TEEB Evaluation Principles: Universality, Comprehensiveness, and Inclusion

I have described TEEBAgriFood at length because it likely constitutes the most advanced, state-of-the-art model for comprehensive systems evaluation that exists: a multidimensional, integrated, systems-based, and complexity-informed approach. The TEEBAgriFood Evaluation Framework has three guiding principles that are relevant to any comprehensive approach to evaluation: universality, comprehensiveness, and inclusion. As a *universal* framework, its elements are defined and described in a uniform, methodical, and consistent manner, to be used in any geographical, ecological, or social context, at the levels of society, organizations, programs, or even individuals. The framework is *comprehensive* in that it acknowledges all significant impacts or dependencies of the food system, be they economically visible or invisible, along any segment of the food value chain. Finally, the framework is *inclusive* in that it supports multiple approaches to assessment. Although the accounting and accountability-based nature of the framework directly supports analysis in line with economic theory and valuation of impacts on human well-being in monetary value addition terms, this is neither possible nor appropriate for all aspects of human well-being. Incorporation of qualitative, physical, and nonmonetary valuations provides important insights, as do a plurality of value perspectives and assessment techniques. These three guiding principles result in a framework design and approach that can truly represent a holistic perspective for evaluating any food system, or, for that matter, any system in any domain of interest (TEEB, 2018a, chapter 4; 2018b, chapter 6).

Conclusion

Ruth Richardson, Executive Director of the Global Alliance for the Future of Food, has succinctly summarized the importance of this work: “The TEEBAgriFoodFramework is arguably one of the most important tools we now have in our food systems toolbox to understand, analyze, and shift food systems through its ability to highlight what’s wrong with the current system and point to changes needed to bring about a more desirable future, while leaving no one behind” (Richardson, 2018, p. 6). For evaluators I believe TEEB can become one of the most important tools in our repertoire. Have a look.

References

- Carter, D. W., Perruso, L., & Lee, D. J. (2001). *Full cost accounting in environmental decision-making*. Gainesville: Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.
- Food and Agriculture Organization. (2017). *Sustainability pathways*. Retrieved from <http://www.fao.org/nr/sustainability/full-cost-accounting/en/>
- Hussain, S., & Vause, J. (2018). TEEB for agriculture & food: Background and objectives. In *TEEB for Agriculture & Food: Scientific and Economic Foundations* (pp. 12–22). Geneva, Switzerland: UN Environment.
- Levin, H. M., & McEwan, P. J. (2001). *Cost-effectiveness analysis: Methods and applications*. Thousand Oaks, CA: Sage.
- Mader, A., Patrickson, S., Calcaterra, E., & Smit, J. (2011). *TEEB manual for cities: Ecosystem services in urban management*. Geneva, Switzerland: The Economics of Ecosystems and Biodiversity, UN Environment.
- Müller, A., & Sukhdev, P. (2018). *Preface*. In *The Economics of Ecosystems and Biodiversity (TEEB) (2018). Measuring what matters in agriculture and food systems: A synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report*. Geneva, Switzerland: UN Environment.
- Patton, M. Q. (2011). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. New York, NY: Guilford.
- Patton, M. Q. (2018). *Principles-focused evaluation: The GUIDE*. New York, NY: Guilford.
- Richardson, R. (2018). Foreword. In S. Hussain & J. Vause (Eds.), *TEEB for Agriculture & Food: background and objectives*. In *TEEB for Agriculture & Food: Scientific and Economic Foundations* (p. 6). Geneva, Switzerland: UN Environment.
- Systems in Evaluation Topic Interest Group. (2018). *The systems in evaluation topical interest group*. Retrieved from <https://www.systemsinevaluation.com>
- Williams, B. (2005). Systems and systems thinking. In S. Mathison (Ed.), *Encyclopedia of evaluation* (pp. 405–412). Thousand Oaks, CA: Sage.
- Williams, B. (2008). Systemic inquiry. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (Vol. 2, pp. 854–859). Thousand Oaks, CA: Sage.
- Williams, B., & Hummelbrunner, R. (2011). *Systems concepts in action: A practitioner's toolkit*. Stanford, CA: Stanford University Press.
- Williams, B., & Iman, I. (2006). *Systems concepts in evaluation: An expert anthology* (American Evaluation Association Monograph No. 6). Point Reyes, CA: Edge Press.