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Fulfilling the Human Right to Food and a Healthy Environment: Is It Time for an Agroecological and Aquaecological Revolution?

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FULFILLING THE HUMAN RIGHT TO FOOD AND A HEALTHY ENVIRONMENT: IS IT TIME FOR AN AGROECOLOGICAL AND AQUAECOLOGICAL REVOLUTION?

Anastasia Telesetsky*

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INTRODUCTION

The start of the Green Revolution was a time of optimism. Fueled by chemical fertilizers, new hybrid seeds, and a sense of moral righteousness, the Green Revolution increased field productivity through the magic of science and innovation. Yet this short-term miracle of technology has failed to deliver a long-term solution to malnutrition and food shortages. Concerned with feeding the largely disenfranchised and hungry populations of the Global South, the makers of the Green Revolution failed to contemplate that though their interventions would provide semi-reliable harvests for some of the poorest individuals in the world, they would also transform human agriculture into an industry largely defined by chemical dependency and ultimately diminishing yields Today, 40% of the 437 million farms in developing states that feed approximately two-thirds of the human

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population are dependent on Green Revolution technologies.¹ In practice, the Green Revolution simultaneously succeeded and failed. It succeeded for the earliest generations or poor communities who benefited from the extra crop yields, but it is failing the current generation that is left with a legacy of contaminated soils and waters.

The continued need to achieve the high yields associated with the Green Revolution becomes increasingly important when contemplating current rising global demographic trends.² The United Nations Food and Agricultural Organization (FAO) predicts that a 70% increase in food may be needed to feed the increasing population.³ In response to increasing population projections, States have chosen to invest in known conventional food security strategies rather than explore less-tested strategies that might achieve both food security and environmental security. For example, the market for nitrogen fertilizer, a key input for the Green Revolution, is predicted to reach an all-time global production high of 200.5 million tons in 2018—24% more than the global usage in 2008.⁴ Much of this usage is concentrated in states with large populations, such as China, where the rate of fertilizer application has increased four-fold over about three decades.⁵ Applying large amounts of agricultural fertilizer to achieve industrial-level crop yields has profound implications for the environment, including substantial contributions to both global greenhouse gas emissions and contaminated water tables.⁶

1. STEFAN BRINGEZU ET AL., WORKING GRP. ON LAND & SOILS, INT'L RES. PANEL, ASSESSING GLOBAL LAND USE: BALANCING CONSUMPTION WITH SUSTAINABLE SUPPLY 36 (2014) [http://www.unep.org/resourcepanel/Portals/50244/publications/Full_Report-Assessing_Global_Land_UseEnglish_\(PDF\).pdf](http://www.unep.org/resourcepanel/Portals/50244/publications/Full_Report-Assessing_Global_Land_UseEnglish_(PDF).pdf).

2. The global predictions for population include approximately 9.7 billion people by 2050 with most of this population concentrated in Asia and Africa. POPULATION DIV., UNITED NATIONS DEP'T. OF ECON. AND SOC. AFFAIRS, WORLD POPULATION PROSPECTS: THE 2015 REVISION, KEY FINDINGS AND ADVANCE TABLES 1 (2015), http://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf.

3. FOOD AND AGRIC. ORG. OF THE UNITED NATIONS [FAO], HARVESTING AGRICULTURE'S MULTIPLE BENEFITS: MITIGATION, ADAPTATION, DEVELOPMENT AND FOOD SECURITY: POLICY BRIEF (2009). <http://www.fao.org/publications/card/en/c/953d3ac2-9ca3-5fca-ac96-08ee22b5e6f2/>.

4. See FAO, WORLD FERTILIZER TRENDS AND OUTLOOKS TO 2018, at 8 (2015), <http://www.fao.org/3/a-i4324e.pdf> (showing that total fertilizer nutrient consumption has increased from 161.829 million MTs in 2008 to 200.522 million MTs in 2018).

5. L.E.D. Smith & G. Siciliano, *A Comprehensive Review of Constraints to Improve Management of Fertilizers in China and Mitigation of Diffuse Water Pollution from Agriculture*, 209 AGRIC., ECOSYSTEMS & ENV'T 15, 15–16 (2015).

6. Olivier De Schutter (Special Rapporteur on the Right to Food), *Final Report: The Transformative Potential of the Right to Food*, at para. 7, U.N. Doc. A/HRC/25/57 (Jan. 24, 2014) (noting that 15% of direct global emissions is attributed to use of fertilizers and intensified grazing, and that 15% of indirect global emissions is attributed to transport and production of fertilizers, herbicides, and pesticides).

This Article asks whether states in pursuit of cheap outputs of food to feed burgeoning populations should continue to pursue status quo domestic food security strategies that are likely to threaten long-term environmental security. More production promotes immediate food security, but governments also have human rights obligations, including the duty to respect, promote, and fulfill both the “right to food”⁷ and the “right to a clean and healthy environment.”⁸ Existing industrial food production strategies pose legitimate threats to achieving long-term food security objectives. Part I of this Article reviews the impact of industrial food production on environmental resources. Part II explores the intersection between the human right to food and the human right to a clean and healthy environment. Part III proposes additional legal interventions in support of strategies for ensuring the full realization of both the right to food and the right to a clean and healthy environment.

I. INDUSTRIALIZED FOOD PRODUCTION’S ENVIRONMENTAL IMPACTS

Modern food production is not an environmentally benign activity. As J.B. Ruhl has documented, industrial agriculture has an inventory of harms including habitat loss, soil erosion, impacts on water quality, air pollution, and contamination from pesticides.⁹ While the productivity of agricultural land has increased over the decades because of improved irrigation, better seeds, machinery, fertilizers, herbicides, and pesticides, so too have environmental impacts like salinization of land, subsidence of land, and eutrophication of waters.¹⁰ Increasing yield rates are not a given. In fact, yield increases on cereals and other primary crops have slowed down.¹¹

Of particular concern among agricultural experts is the current state of soil, which has failed to attract much global attention in spite of 2015 being declared the United Nations Year of Soils.¹² Recent reports suggest that soil

7. Jean Ziegler (Special Rapporteur on the Right to Food), *Promotion and Protection of all Human Rights, Civil, Political, Economic, Social and Cultural Rights, Including the Right to Development*, at para. 17, U.N. Doc. A/HRC/7/5 (Jan. 10, 2008).

8. BURNS H. WESTON & DAVID BOLLIER, *GREEN GOVERNANCE: ECOLOGICAL SURVIVAL, HUMAN RIGHTS, AND THE LAW OF THE COMMONS* 29 (2013).

9. J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 *ECOLOGY L.Q.* 263, 264 (2000).

10. FAO, *THE STATE OF THE WORLD’S LAND AND WATER RESOURCES FOR FOOD AND AGRICULTURE: MANAGING SYSTEMS AT RISK* ix–x (2011), <http://www.fao.org/docrep/017/i1688e/i1688e.pdf>.

11. BRINGEZU ET AL., *supra* note 1, at 46.

12. G.A. Res. A/RES/68/232, *World Soil Day and International Year of Soils* (Dec. 20, 2013).

is being lost at a rate many times greater than the current replenishment rate.¹³ For example, in Africa, if soil erosion continues at the current rates, agricultural yields may plummet approximately 16.5% by 2020.¹⁴ Other reports suggest that attempts to increase yields through selective breeding have ultimately contributed to declines in the nutritional value of foods over the past several decades.¹⁵ Without large reserves of nutrient-rich soil, global society faces a dilemma concerning how to ensure not just enough calories for future generations but enough vitamins and minerals. Already a number of states, including industrializing states such as Mexico, face the double misfortune of obesity and malnutrition among the poorest segments of their populations, people who have more than enough empty calories but lack micronutrients.¹⁶ This trend of nutrient-poor soil is not likely to quickly reverse itself because soil is slow to replenish. Adding chemical nutrients to the soil is only a temporary fix because many of the synthetic nutrients are simply washing off the land and into watercourses, leading to coastal dead zones in places such as the Mississippi Delta.¹⁷

Much productive soil is laced with pesticides, fungicides, and herbicides.¹⁸ While the application of such toxic substances has improved yields, agricultural workers are often exposed to high doses of these chemicals, leading to adverse human health effects.¹⁹ Harmful environmental effects include surface water contamination, groundwater contamination, soil contamination, and long-term effects on soil fertility.²⁰ Studies regarding the loss of soil fertility are particularly disconcerting because they have received little attention from policymakers. Multiple studies demonstrate that

13. Ronald Amundson et al., *Soil and Human Security in the 21st Century*, SCIENCE, May 8, 2015, at 647.

14. Rattan Lal, *Erosion–Crop Productivity Relationships for Soils of Africa*, 59 SOIL SCI. SOC’Y AM. J. 661, 666 (1995).

15. See generally Donald R. Davis, *Declining Fruit and Vegetable Nutrient Composition: What Is the Evidence?*, 44 HORTSCIENCE 15–19 (2009) (observing historic declines between 5% and 40%).

16. Sherry A. Tanumihardjo et al., *Poverty, Obesity and Malnutrition: An International Perspective Recognizing the Paradox*, 107 J. AM. DIETETIC ASS’N 1966, 1966–72 (2007).

17. See Nancy N. Rabalais et al., *Nutrient Changes in the Mississippi River and System Responses on the Adjacent Continental Shelf*, 19 ESTUARIES 386, 392, 396, 400 (1996) (noting that rising nitrate levels in Mississippi Delta water coincides with an increased use of nitrogen fertilizers in the watershed).

18. Md. Wasim Aktar et al., *Impact of Pesticides Use in Agriculture: Their Benefits and Hazards*, 2 INTERDISC. TOXICOLOGY 1, 5 (2009).

19. *Id.* at 3.

20. *Id.* at 5.

common herbicides interfere with a plant's ability to fix nitrogen, which is an essential process supporting plant growth.²¹

Regarding the underlying conditions of soil, we may be at the brink of an "empty field" syndrome that can be largely attributed to poor-quality soils. Reviewing dozens of global, regional, and national studies in developing countries, the International Food Policy Research Institute concludes that approximately 23% of global soils are in a state of degradation, and of those soils, 38% are on agricultural lands.²² Some of this trend is reflected in the increasing level of desertification taking place globally as a result of large-scale export-oriented agriculture, including exports of non-food commodities such as fiber used in the production of biofuel. For example, recent case studies in Burkina Faso suggest that producing cotton for export is currently degrading land that might otherwise be used to produce commodity crops.²³ Current responses to the "soil crisis" have been limited. While 168 countries are experiencing some form of desertification, States continue to push for heavy synthetic fertilizer applications in order to achieve increased yields.²⁴ Yet synthetic nitrogen fertilizer is now considered by some scientists to be undermining long-term soil health.²⁵

Equally problematic is the business of livestock production. The days of small herders have become numbered as the commons becomes increasingly fenced in and pastoralists have few places to bring their herds. Production of meat now relies on contained animal feed lots, subtherapeutic doses of antibiotics typically used to treat humans, and manure lagoons. With the growing global middle class increasingly interested in meat consumption, land is being deforested to graze animals and waterways are becoming

21. R. Arias & P. Fabra, *Effects of 2,4-Dichlorophenoxyacetic Acid on Rhizobium sp. Growth and Characterization of its Transport*, 68 TOXICOLOGY LETTERS 267, 267 (1993); A. Santos & M. Flores, *Effects of Glyphosate on Nitrogen Fixation of Free-Living Heterotrophic Bacteria*, 20 LETTERS IN APPLIED MICROBIOLOGY 349, 352 (1995).

22. Sara J. Scherr, *Soil Degradation: A Threat to Developing-Country Food Security by 2020?* 17 (Int'l Food Policy Research Inst., Food, Agric. & the Env't Discussion Paper 27, 1999), <http://www.env-edu.gr/Documents/Soil%20Degradation%20-%20A%20Threat%20to%20Developing-Country%20-%20Food%20Security%20by%202020.pdf>.

23. KARIM HUSSEIN ET AL., SAHEL & WEST AFRICA CLUB, ECONOMIC AND SOCIAL IMPORTANCE OF COTTON IN WEST AFRICA: ROLE OF COTTON IN REGIONAL DEVELOPMENT, TRADE AND LIVELIHOODS 9 (2005), http://hubrural.org/IMG/pdf/csao_etude_socio_eco_coton_eng.pdf.

24. Press Release, United Nations Convention to Combat Desertification, 168 Countries Affected by Desertification, Country Reports Show (April 14, 2013), <http://www.unccd.int/en/media-center/MediaNews/Pages/highlightdetail.aspx?HighlightID=187>.

25. Richard Mulvaney et al., *Synthetic Nitrogen Fertilizers Deplete Soil Nitrogen: A Global Dilemma for Sustainable Cereal Production*, 38 J. ENVTL. QUALITY 2295, 2295, 2298 (2009).

regularly stressed by manure runoff.²⁶ Manure from animal operations that was once repurposed as fertilizer has become a major source of pollution.²⁷ Overgrazing is common in some of the most food-stressed areas of the world including, for example, the Mongolian steppe where overgrazing may be leading to locust outbreaks.²⁸

Agriculture and livestock production are not the only food production with serious consequences for long-term environmental sustainability. The current chemically-intensive approach to agriculture was born after World War II, as were the industrial fishing fleets.²⁹ Industrial fishing practices have taken their toll on the oceans. Many commercial stocks are depleted or are struggling to recover.³⁰ With the decline in stocks, humans are both fishing down the food chain and becoming “roving bandits,” crossing the seas in pursuit of untapped stocks once one area’s stocks become depleted.³¹

States have been working at cross-purposes, striving to meet food security needs by increasing the scale of food production. Many states ignore environmental security concerns and long-term sustainable production issues, such as soil quality, at their own peril. Today, most states generate food for domestic consumption and offer surplus agricultural commodities for export, but have largely not assessed the environmental costs of intensive industrial production of food.

26. See generally David Tilman et al., *Agricultural Sustainability and Intensive Production Practices*, NATURE, Aug. 8, 2002, at 671, 671 (stating that by 2050 income increases will promote more meat-heavy diets, and in turn will double the demand for grain; raising concerns in part because of the amount of nitrogen and phosphorus that agriculture adds to the ecosystem).

27. Robert Howarth et al., *Nutrient Management, Responses Assessment*, in 3 ECOSYSTEMS AND HUMAN WELL-BEING, POLICY RESPONSES 295, 303 (Kanchan Chopra et al. eds., 2005).

28. Thomas Hilker et al., *Satellite Observed Widespread Decline in Mongolian Grasslands Largely Due to Overgrazing*, 20 GLOBAL CHANGE BIOLOGY 418 (2013) (describing how increased sizes of herds have led to desertification on the Mongolian steppe between Western China and Mongolia); Arianne J. Cease et al., *Heavy Livestock Grazing Promotes Locust Outbreaks by Lowering Plant Nitrogen Content*, SCIENCE, Jan. 27, 2012, at 467, 467–79 (describing the unexpected link between locust outbreaks and grassland degradation by excessive stock use).

29. See, e.g., Harry Schreiber & Benjamin Jones, *Fisheries Policies and the Problem of Instituting Sustainable Management: The Case of Occupied Japan*, in LIVELIHOODS, NATURAL RESOURCES, AND POST-CONFLICT PEACEBUILDING 287, 292–93 (Helen Young & Lisa Goldman eds., 2015) (describing the growth in shipbuilding that increased Japanese fishing effort after the war and the encouragement for Japan to expand its fleet through post-reconstruction policies).

30. See generally FAO, STATE OF WORLD FISHERIES AND AQUACULTURE 7 (2014), <http://www.fao.org/3/a-i3720e.pdf> (asserting that only 71% of marine fish stocks were sustainably fished in 2011, compared to 90% in 1974).

31. See generally Daniel Pauly et al., *Fishing Down Marine Food Webs*, SCIENCE, Feb. 6, 1998, at 860, 860–63 (examining how over-capitalization has forced the fishing industry to move to lower levels of the food web); see also F. Berkes et al., *Globalization, Roving Bandits, and Marine Resources*, SCIENCE, Mar. 17, 2006, at 1557, 1557–58 (“[R]oving bandits can be explained by ‘tragedy of the commons,’ whereby a freely accessible . . . resource is competitively depleted.”).

Powerful actors, such as major agribusiness landowners or large industrial fleets, create environmental risks that remain largely unassessed across the globe. Unlike mining, timber, and other extractive industries, industrial agriculture and fishing remain exempt from environmental review despite arguable similarities among their for-profit strategies. As will be suggested in the next Part, States must focus greater attention on tackling the environmental threats associated with existing production in order to satisfy their obligations to uphold fundamental human rights. Despite promising innovations in chemistry and biotechnology, we remain dependent on the complexity of an environment that we are not able to easily replicate using our existing technologies.

II. RELATIONSHIP BETWEEN THE RIGHT TO FOOD AND RIGHT TO A HEALTHY ENVIRONMENT

As States strategize on how to achieve food security, they also have obligations to protect, respect, and fulfill human rights. Here, rights refer to either individual or community interests that the government has a duty to address by either creating conditions to facilitate the achievement of a right or removing barriers that prevent the achievement of a right. Two rights have been defined separately in the literature: the right to food and the right to a clean and healthy environment. These rights are particularly noteworthy in the context of industrial food production described in the Part above.³² This Part will describe the right to food, the right to a clean and healthy environment, and the interdependency of those two rights.

A. Right to Food

The right to food is a human right that has garnered a great deal of attention in the past couple decades, leading to the creation by the United Nations Human Rights Council of a Special Rapporteur on the Right to Food.³³ A right to food was first specifically contemplated in the Universal Declaration of Human Rights. Article 25 provides that “[e]veryone has the right to a standard of living adequate for the health and well-being of himself

32. See Mohamed Ali Mekouar, *Food Security and Environmental Sustainability: Grounding the Right to Food on Agroecology*, 44 ENVTL. POL’Y & L. 44, 44 (2014) (suggesting that the right to food and the right to a healthy environment are dependent on a “harmonious balance of the nature-agriculture couple,” which may be broken by “continuously overexploited and depleted” natural resources).

33. Commission on Human Rights, Rep. on the Fifty-Sixth Session, at 29, U.N. Doc. E/CN.4/2000/167 supp. 3 (2000).

and of his family, including food . . .”³⁴ While the Declaration is not itself binding, many of the rights identified in the Declaration have been embraced by subsequent legally binding agreements. Article 11 of the Convention on Economic, Social, and Cultural Rights provides that State parties “recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food . . . [and] take appropriate steps to ensure the realization of this right.”³⁵ In 1999, the United Nations Committee on Economic, Social and Cultural Rights offered its comprehensive interpretation of Article 11 in General Comment 12.³⁶ The Committee understands it as a fundamental right necessary “for the enjoyment of all rights” that is “indivisibly linked to the inherent dignity of the human person” and “indispensable for the fulfillment of other human rights enshrined in the International Bill of Human Rights.”³⁷ The Committee has not made its thoughts clear about the relationship between the right to food and the right to a healthy environment. The Committee opined that the right to adequate food includes the notion of “sustainability.”³⁸ As defined by the Comment, “sustainability is intrinsically linked to the notion of adequate food or food security,” reflecting accessibility “for both present and future generations,” and requiring “long-term availability and accessibility.”³⁹ Yet the requirement to protect soils, waters, and fisheries from damaging food production practices is never precisely identified by the Comment authors, except for one reference to the necessity for “productive land or other natural resources.”⁴⁰ Instead, the concept of sustainability is treated simply as an extension of “food availability” and “access.”⁴¹ Without more explicit references to protecting environmental values, the issue becomes whether General Comment 12 should be read to refer primarily to concerns for economic and social sustainability, or whether the drafters intended the Comment to catalyze States into taking measures to promote sustainable agriculture or fishing practices and potentially end food production practices that are environmentally damaging.

34. G.A. Res. 217 A (III), at art. 25, Universal Declaration of Human Rights (Dec. 10, 1948).

35. International Covenant on Economic, Social and Cultural Rights art. 11, Jan. 3, 1976, 993 U.N.T.S. 3.

36. United Nations Comm. on Economic, Social and Cultural Rights, *Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights: The Right to Adequate Food*, U.N. Doc. E/C.12/1999/5 (May 12, 1999).

37. *Id.* at paras. 1, 4.

38. *Id.* at paras. 7–8.

39. *Id.* at para. 7.

40. *Id.* at para. 12.

41. *See id.* at paras. 7–8 (discussing broadly the idea of sustainability in food availability and access).

In theory, as long as food is available and accessible to future generations, it would meet the qualifications of “sustainability” in the Comment. To the extent that environmental protection matters, it is understood as an aspect of “social justice.”⁴² Based on the written content of the Comment, it would be fair to conclude that “adequate food” for future generations—as included in Article 11 of the Covenant on Economic, Social and Cultural Rights—encompasses all food production methodologies. Food might be raised in closed-cycle greenhouses or grown synthetically to meet nutritional needs. The need for a healthy environment, where there are sufficiently functional ecosystem processes such as nitrogen fixation, would be taken out of the equation. There is no bias in favor of small-scale production or environmentally-friendly production. As long as food continues to be available and accessible, States can condone the use of excess fertilizers, pesticides, or herbicides until the applications of these substances jeopardize production and undermine food availability and access under the Comment.

While the “right to adequate food” has been a binding obligation for over 40 years, it has only recently been identified as having a key environmental component. The First Special Rapporteur on the Right to Adequate Food, Jean Ziegler, defined the right to food as

regular, permanent and unobstructed access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensures a physical and mental, individual and collective, fulfilling and dignified life free of fear.⁴³

“[Q]ualitatively adequate” in the above definition refers to safety concerns that food be unadulterated and properly handled.⁴⁴ This definition focuses on avoiding human suffering associated with hunger and foods that pose risks to human health.⁴⁵ No mention is made of food production that poses risks to the health and integrity of the global environment.

It was only in 2014 that publication of the Second Special Rapporteur’s report made the role of a healthy environment in achieving the right to food explicit. He wrote that:

42. *Id.* at para. 4.

43. Ziegler, *supra* note 7, at para. 17.

44. *Id.* at para. 3 (introducing “adequate food” in terms of nutritional deprivation).

45. *Id.* (explaining human suffering in terms of the physical consequences).

[t]he right to food is the right of every individual, alone or in community with others, to have physical and economic access at all times to sufficient, adequate and culturally acceptable *food that is produced and consumed sustainably*, preserving access to food for future generations.⁴⁶

He called for States to change food production policies, including a policy for sustaining a genetic diversity of seeds and regulating the industrial fishing sector to prevent overexploitation.⁴⁷ While civil society groups have been raising issues about food production for decades, the Second Special Rapporteur's report reflects a turning point in human rights thinking about the right to adequate food. Now, the right to food embraces not just the physical availability or accessibility of food but also how available food is produced. Not all food production methods satisfy the human right to food. Based on Olivier De Schutter's revised definition, employing technologies that jeopardize future food production by depleting necessary resources may violate the right to food. This new definition has profound implications for some ecologically wasteful activities that are common practice in the agricultural and fishing industries.

B. Right to a Healthy Environment

The human right to a healthy environment is not easily defined. Unlike the right to food, there is no single international reference to the right to a healthy environment; instead, there are an assortment of sources available. As Burns Weston and David Bollier suggest, the right exists as a combination of a derivative entitlement based on other human rights; either an autonomous right embodied within regional laws and national constitutions, or a form of procedural environmental rights based on the right to environmental information and to participate in decisionmaking that impacts the environment.⁴⁸

As a derivative right, the right to a healthy environment is a prerequisite for other fundamental rights, such as a right to life or health.⁴⁹ As an autonomous right, the right takes on a number of manifestations. For example, the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social, and Cultural Rights provides that

46. De Schutter, *supra* note 6, at para. 2 (emphasis added).

47. *Id.* at annex, at 21–22.

48. WESTON & BOLLIER, *supra* note 8, at 33–34.

49. *Id.*

individuals “have the right to live in a healthy environment” and that Parties “shall promote the protection, preservation, and improvement of the environment.”⁵⁰ At least 56 constitutions recognize some variation of the right to a healthy environment.⁵¹ What constitutes the minimal right to a healthy environment is not easily ascertained because the “juridical recognition and jurisdictional reach” of the right vary greatly.⁵² The Human Rights Council recognizes that the right to food depends on managing anthropogenic threats to the environment, such as climate change and desertification.⁵³ The Special Rapporteur on Human Rights and the Environment alluded to the work of the Special Rapporteur on the Right to Food but has yet to independently examine the role of food production in achieving a healthy environment.⁵⁴ Food production may provide a fruitful topic for future commentary by both Special Rapporteurs.

C. What is the Relationship Between These Two Rights?

Olivier De Schutter, in his 2014 report as the Special Rapporteur on the Right to Food, concluded that the right to food requires States to ensure the availability of environmentally sustainable food. For him, fulfilling the right to food also means fulfilling a right to a healthy environment, where soil is fertile, and water sources are not contaminated by agricultural byproducts. While this conclusion has moral appeal, the question is whether the conclusion is legally sound. Do States have an obligation to only adopt food production methods that contribute to a healthy environment?

As explained above, the right to food and the right to a healthy environment developed in very different ways. While there is a general consensus about the right to food, there is far less agreement about what to expect from a State fulfilling its environmental human rights obligations. What is the relationship between two rights that can coexist but also compete? Are they separate rights, or is the right to a healthy environment an

50. The Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights “Protocol of San Salvador” art. 11, Nov. 17, 1988, O.A.S.T.S. 69.

51. WESTON & BOLLIER, *supra* note 8, at 321, 325 (including quotations from Constitutions providing for a “healthy and ecologically balanced human environment” in Portugal, “an auspicious environment” in Slovak, and a “healthy living environment” in Slovenia.).

52. *Id.* at 29.

53. John H. Knox (Independent Expert), *Rep. of the Independent Expert on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment*, at para. 19, U.N. Doc. A/HRC/22/43 (Dec. 24, 2012).

54. *Id.* at para. 22.

extension of the right to food that is produced and consumed sustainably? There is no obvious answer.

Human rights scholar, Thomas Meron, explores the possibility of a human rights hierarchy. He observes that:

[c]laims of hierarchial status are . . . raised as to the relationship among rights belonging to the so-called first generation (civil and political rights), second generation (economic, social and cultural rights) and third generation (solidarity rights, e.g., the rights to peace, development and a protected environment).⁵⁵

The General Comment's right to food interpretation might trump the competing right to a healthy environment interpretation because recognizable second-generation rights should be given preference over poorly-defined third-generation rights. While Meron offers no specific opinions about second-generation versus third-generation rights, he concludes that the legal community may want to invest in "defining the distinction between ordinary and higher rights and the legal significance of this distinction" as a means of "resolving conflicts between rights."⁵⁶ Ranking rights could prove useful when a court must balance interests between competing rights, but ranking rights is unsatisfactory. Whose discretion matters when making judgments among various human rights? Do diplomats make these decisions? Does the Human Rights Council make these decisions? Or do citizens decide between ordinary and higher rights?

A better approach is granting equal treatment to all human rights since they are interdependent,⁵⁷ meaning rights should be interpreted inclusive of other rights rather than as independent rights. The right to food must be interpreted to include the right to a healthy environment. A substantive right to a healthy environment must also be interpreted as including a right to food such that states must factor essential agriculture and fisheries use into their conservation planning.

When conflicts arise between rights—for example, the State releases land reserved for conservation purposes for limited agricultural use—States can reprioritize obligations to create favorable conditions to satisfy rights. Jeremy Waldron, in an essay about conflicting rights, offers an interesting

55. Theodor Meron, *On a Hierarchy of International Human Rights*, 80 AM. J. INT'L L. 1, 2 (1986).

56. *Id.* at 22.

57. World Conference on Human Rights, *Vienna Declaration and Programme of Action*, at para. 5, U.N. Doc. A/Conf.157/23 (June 25, 1993).

thought experiment.⁵⁸ He asks readers to compare two legitimate rights of individuals A and B to medical care. He indicates that even if A's needs are unsatisfied due to a shortage of medical resources, the State cannot simply continue a business-as-usual approach.⁵⁹ Because A's right to medical care is not met, the State must prioritize systematic changes—such as changing national production priorities—to improve the chance of eventually fulfilling A's right to medical care.⁶⁰

A similar thought experiment could apply to the right to food and the right to a healthy environment. City resident A has the right to obtain culturally appropriate and nutritious food that is physically and economically accessible. Rural resident B has the right to a healthy environment free of chemical drift and contaminated waterways. A shortage of existing food that is economically accessible may not allow for rural resident B's need to be immediately satisfied. However, because B's right has not been met, the State still has an obligation to B and must prioritize systemic changes to food production that will eventually protect B's right to a healthy environment.

If we accept that human rights are interdependent and that a given human right, such as the right to food, should be inclusive of other rights, then De Schutter's conclusion that food production should support a healthy environment is legally sound. Pragmatically, States must undertake new approaches to achieve food security. Industrial agriculture and fishing practices encourage the waste of natural capital, such as soil, and violate the human right to food. How food is produced matters both for the individual rights of food production workers, such as farm laborers regularly exposed to toxic chemicals as part of industrial farming, and for the communities that rely on proper land and water stewardship for future harvests.

III. LEGAL INTERVENTIONS SUPPORTING THE RIGHT TO FOOD AND THE RIGHT TO HEALTHY ENVIRONMENT AS INTERDEPENDENT RIGHTS

At the international policy level, ideas about the green economy are introduced in response to perceived ambiguities associated with implementing sustainable development. The green economy is not meant to be a substitute for sustainable development but is rather meant to promote a strategy for achieving the goals of sustainable development by focusing on economic sectors, including agriculture and fishing. Little academic or policy work considers the relationship between the green economy and law. Most legal conversations instead become general calls for implementing a green

58. Jeremy Waldron, *Rights in Conflict*, 99 *ETHICS* 503, 503 (1989).

59. *Id.* at 512.

60. *Id.*

economy. What would conceptualizing a green economy that fulfills both a right to food and a right to healthy environment mean? Answering this question requires a two-pronged approach based on reforming the existing system, which is heavily invested in industrial agriculture, and prospectively creating a new system.

A. Reforming Existing Production Subsidies that Undermine the Right to a Healthy Environment

The current food production system favors large-scale investments with large environmental externalities over more experimental but promising investments designed to reduce environmental externalities, such as aquaponics. States support industrial agriculture through various subsidies in the form of income stabilization or tax credits to encourage certain system-wide behavior. States must reassess their production subsidies and remove payments or credits that do not reflect investments that protect the environment for future generations. For example, the United States currently has a fishing and farming fuel tax credit that provides credits or refunds for fuel when used by a boat for commercial fishing or by a farm “for farming purposes.”⁶¹ This indirect subsidy keeps costs of food lower, but may encourage fishing vessels to travel longer distances or farms to deploy more vehicles using fossil fuels.

Civil society groups continue to provide valuable reviews of subsidies. For example, in a bipartisan effort, Friends of the Earth, Taxpayers for Common Sense, and the R Street Institute publish the *Green Scissors Report* and the *Green Scissors Database* to highlight the environmental impacts and fiscal responsibility associated with subsidies and pork-barrel projects.⁶² In 2014, the group concluded that removing subsidies from industrial agribusiness would alleviate pressure on land and water resources, saving taxpayers approximately \$79 billion dollars by 2024.⁶³ The subsidies identified for cuts include the Environmental Quality Incentives Program (EQIP), which is used to support environmentally unsustainable livestock

61. I.R.S., PUBLICATION 510: EXCISE TAXES (INCLUDING FUEL TAX CREDITS AND REFUNDS) 14, 17, 19 (2016), <https://www.irs.gov/pub/irs-pdf/p510.pdf>.

62. GREEN SCISSORS, <http://greenscissors.taxpayer.net/> (last visited May 29, 2016).

63. Press Release, GreenScissors, Broad Coalition Launches Tool to Cut Wasteful Spending and Protect Environment (Nov. 17, 2014), <http://greenscissors.taxpayer.net/news/Green-Scissors-Coalition-Releases-New-Subsidy-Database>.

production.⁶⁴ In 2008, concentrated animal feeding operations (CAFOs) lobbied effectively to qualify for EQIP funds to cover waste cleanup costs associated with CAFOs, and those subsidies continue today.⁶⁵

The *Green Scissors Report* provides critical insight for environmental advocates and regulators. Yet these reports are external nongovernmental reports. While these reports may influence individual government decisionmakers, they are not “owned” by the government offices because they are not produced internally. To speedily replace environmentally-unsound subsidies with subsidies that target environmentally-desirable behavior, the United States General Accounting Office (GAO) could publish a report on sustainable food production subsidies, which includes the direct costs to taxpayers and indirect costs in natural and social capital. This report would specify losses to soil fertility, losses of pollinators, damages to waterways from eutrophication, and health costs from workers exposed to dangerous chemicals. The GAO published a number of recent reports on crop subsidies, none of which addressed environmental costs of the existing subsidy programs; rather, they focused on economic waste in the existing programs.⁶⁶

B. Design New Subsidies to Transition Food Production

Prospectively, States should consider the types of production that will benefit the public, and the public should pay for the temporary costs of transitioning to new food production systems. For example, if pesticide and herbicide applications yield 100 units of some commodity per acre but integrated pest management techniques yield only 90 units per acre, then the public should make up the financial shortfall for the farmer. What transitions might be supported by a State that would secure its interests in achieving its human rights obligations? States might finance industry efforts to incorporate agroecological or aquaecological principles into their production processes.⁶⁷

64. *Environmental Quality Incentives Program (EQIP)*, GREEN SCISSORS, <http://greenscissors.taxpayer.net/programs/category/environmental-quality-incentives-program-eqip> (last visited May 29, 2016).

65. Alyssa Charney, *Are Conservation Dollars Polluting our Water?*, FRIEDMAN SPROUT (Apr. 8, 2014), <http://friedmansprout.com/2014/04/08/are-conservation-dollars-polluting-our-water/>.

66. *See generally Farm Programs*, U.S. GOV'T ACCOUNTABILITY OFF., http://www.gao.gov/key_issues/farm_programs/issue_summary#t=1 (last visited May 29, 2016) (listing articles under “Key Reports” about American agriculture legislation and policy).

67. *See generally* AGROECOLOGY, ECOSYSTEMS, AND SUSTAINABILITY (Noureddine Benkeblia ed., 2015) (presenting a collection of scientific articles about agroecology and related case studies from around the world); STEPHEN R. GLIESSMAN, *AGROECOLOGY: THE ECOLOGY OF SUSTAINABLE FOOD SYSTEMS* (Eric Engles ed., 2007) (providing a broad overview of the science behind agroecology and the

Rather than modifying genes or relying on large amounts of inorganic inputs, agroecological approaches to food production capitalize on symbiotic relationships among a number of complementary species that cohabit agroecosystems.⁶⁸ Some states, such as France and Denmark, offer subsidies for implementing agroecological principles.⁶⁹

Olivier De Schutter embraced agroecology as a key production approach that conforms with the human right to food because it enables the existing generation to feed itself and preserves the ability of future generations to feed themselves. His December 2010 report asserts that agroecology is both “environmentally sustainable and socially just” and essential to meeting increasing food demands.⁷⁰ His report indicates that even if biofuel production is curtailed and food for livestock used to feed humans, there would not be enough food to meet future needs.⁷¹ He urges governments to consider the environmental impact of food production and climate change’s effects on food production.⁷² He calls for implementing agroecology into State efforts to achieve the right to food, including “recycling nutrients and energy on the farm, rather than introducing external inputs; integrating crops and livestock; diversifying species and genetic resources in agroecosystems over time and space; and focusing on interactions and productivity across the agricultural system, rather than focusing on individual species.”⁷³ He encourages investment in agroecology projects, such as integrated nutrient management, agroforestry, water harvesting, and integration of livestock into farming practices.⁷⁴

Agroecology must be promoted as an enabling framework for ensuring the right to food because agroecology offers increased yields for individual

complex interactions within); MIGUEL A. ALTIERI, *AGROECOLOGY: THE SCIENCE OF SUSTAINABLE AGRICULTURE* (2nd ed. 1995) (discussing the theoretical basis, design, and management of agroecology and the path towards sustainable agriculture).

68. Norman Uphoff, *Alternative Paths to Food Security*, in *THE OXFORD HANDBOOK OF FOOD, POLITICS, AND SOCIETY* 203, 203–05 (Ronald J. Herring ed., 2015).

69. Loi 2014-1170 du 13 octobre 2014 d’avenir pour l’agriculture, l’alimentation et la forêt [Law 2014-1170 of Oct. 13, 2014 on the Future of Agriculture, Food, and Forestry], *JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE* [J.O.] [OFFICIAL GAZETTE OF FRANCE], Oct. 14, 2014, <https://www.legifrance.gouv.fr/eli/loi/2014/10/13/AGRX1324417L/jo/texte>; Bekendtgørelse om tilskud til investeringer på økologiske bedrifter [Order on Subsidies for Investments in Ecological Farms], BEK nr 1185 [Order No. 1185] (Oct. 15, 2015), <http://faolex.fao.org/docs/pdf/den149190.pdf>.

70. Olivier De Schutter (Special Rapporteur on the Right to Food), *Report Submitted by the Special Rapporteur on the Right to Food*, at para. 1, U.N. Doc. A/HRC/16/49 (Dec. 17, 2010) [hereinafter De Schutter Report].

71. *Id.* at para. 7.

72. *Id.* at para. 9.

73. *Id.* at para. 12.

74. *Id.* at para. 16.

farms, reduces rural poverty, improves nutrition, and helps the food production sector to adapt to climate change. Agroecology must be scaled up as an enabling framework for ensuring the right to food.⁷⁵ De Schutter focused on alleviating chronic hunger in the Global South, and he called upon States to make specific policy reforms including “making reference to agroecology and sustainable agriculture in national strategies for the realization of the right to food”; changing subsidies to support agroecological investments; improving research and dissemination of knowledge among farmers; and improving market access for food produced using agroecological methods.⁷⁶ He called upon the Committee on World Food Security’s High-Level Panel of Experts to assess whether agroecology should be promoted by the 2012 Global Strategic Framework for Food Security and Nutrition.⁷⁷ The first version of the Framework recommended that States, regional organizations, and other interested stakeholders “[c]onsider, as appropriate, an ecosystem approach in agricultural management in order to achieve sustainable agriculture, including for example, but not limited to, integrated pest management, organic agriculture, and other traditional and indigenous coping strategies that promote agroecosystem diversification and soil carbon sequestration.”⁷⁸ States continue to support scaling up agroecology approaches in the most recent version of the UN Committee on World Food Security’s 2015 Global Strategic Framework for Food Security and Nutrition.⁷⁹ While the language in the framework is at best aspirational, it offers a political starting point for states and industries, even though it lacks a call to political and economic actors to make the national or foreign aid investments urged by the Special Rapporteur on the Right to Food.

Strategic financing is key to transitioning to agroecology and drawing upon both traditional knowledge and scientific discoveries. Farmers are relatively conservative about changing their production techniques. As long as there is a crop that can be sold, few farmers will be keen to invest in crop optimization for improved environmental outcomes that require years to realize the improvements. Incentivizing behavior by removing existing perverse subsidies that permit wasting resources and introducing new subsidies that incentivize behavioral changes with less financial risk are

75. *Id.* at paras. 17, 21, 26, 28.

76. *Id.* at para. 44.

77. *Id.* at para. 47.

78. Comm. on World Food Security, FAO, Global Strategic Framework for Food Security and Nutrition, First Version, at para. 53(m) (2012), <http://www.fao.org/docrep/meeting/026/ME498E.pdf>.

79. Comm. on World Food Security, FAO, Global Strategic Framework for Food Security and Nutrition, Fourth Version, at 27 (2015), <http://www.fao.org/3/AV031e.pdf>.

essential prerequisites to achieving food production that protects both the right to food and the right to a healthy environment.

C. Models for Future Human Rights Based Food Production

If our old world of food production is filled with chemical tanks, unending fields of corn, and one-mile-long fishing nets, what might this new world of food production look like? Two states are reimagining food production to offer large-scale alternatives to industrial food production by incorporating ecological principles.

In France, the government passed La Loi d'Avenir pour l'Agriculture, l'Alimentation et la Forêt (the Law for the Future of Agriculture, Food and the Forest) in 2014.⁸⁰ This law is the first of its kind. Seeking to implement green economy principles in food production, the French government created a legal framework that involves more young farmers, reduces pesticide use, and mainstreams agroecological practices.⁸¹ Designated government aid allocations delivered to Economic and Environmental Interest Groupings are among government innovations to mainstream agroecology. These groups are collectives of farmers that pool resources to reduce costs associated with fertilizer and fuel.⁸² They are encouraged to try agroecological techniques including, where appropriate: adopting agroforestry, choosing seeds for breeding, recycling farm effluent, implementing biological control for pests, and engaging in beekeeping.⁸³ Farmers are expected to reduce pesticide use.⁸⁴ The government provided €6.7 million in pilot funding to support 3,300 agricultural holdings to transition to agroecology.⁸⁵

In Spain, the government supports a unique aquaecology pilot at Veta La Palma in Doñana Natural Park. Aquaculture investors constructed 3000 hectares of dual-purpose wetlands that allows for both a fish and shrimp aquaculture venture and ecosystem restoration for 94 bird species and 21 fish

80. Loi 2014-1170 du 13 octobre 2014 d'avenir pour l'agriculture, l'alimentation et la forêt [Law 2014-1170 of Oct. 13, 2014 on the Future of Agriculture, Food, and Forestry], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Oct. 14, 2014, <https://www.legifrance.gouv.fr/eli/loi/2014/10/13/AGRX1324417L/jo/texte>.

81. AGRICULTURE PRODUISONS AUTREMENT, 10 KEYS TO UNDERSTANDING AGROECOLOGY 6–7 (2014) <http://agriculture.gouv.fr/telecharger/58145?token=5c5d2aed24cfa6eb606b3628027b7f80>.

82. *Id.*

83. *Id.* at 10–23 (outlining these agroecological techniques alongside the goals and principles of their implementation).

84. *Id.* at 9.

85. *Id.* at 25.

species.⁸⁶ Veta La Palma is managed as both a farm and a wetland and represents a unique model for considering how to integrate additional food production into a sensitive landscape. To restore an additional 20,000 hectares of degraded wetlands, other sites are being explored along the southwest Atlantic coast of Spain and Portugal as well as several thousand hectares along the Mediterranean Sea.⁸⁷ The legal challenge will be ensuring the accountability of a for-profit enterprise within the management scheme of a protected area. Organizations such as the United Nations Environment Programme's Regional Centre for Specially Protected Areas recognize the potential of aquacology as an alternative to destructive marine capture practices. Accordingly, they offer guidelines about how to balance production goals with environmental conservation. This includes issuing an environmental impact assessment before commencing the project; monitoring the carrying capacity of waters to avoid impacts on local flora and fauna; using low-trophic feed to avoid exacerbating overfishing issues; and managing pest control of non-wetland birds and rodents.⁸⁸

For states with fragmented land tenure regimes, it is challenging to determine where to locate large-scale agroecology and aquacology projects. One potentially fruitful area for future research would be to evaluate the uptake of agroecology or aquacology projects within the 651 designated United Nations Educational, Scientific, and Cultural Organization biospheres.⁸⁹ This is because it would be useful to understand food production approaches within areas where States have committed to management plans that integrate conservation and development interests. This type of review may provide some future insights for integrating agroecology or aquacology across a landscape.

Not all states will be able to follow France's lead in implementing agroecology or Spain's approach to aquacology. Many states in the Global South face acute food shortages that require immediate food supplies. Temporary food aid might address these existing shortages, but this approach creates an unnecessary risk of undermining local agricultural and fishing enterprises and creating a dependency on food aid. Implementing the

86. M.E.M. Walton et al., *A Model for the Future: Ecosystem Services Provided by the Aquaculture Activities of Veta la Palma, Southern Spain*, AQUACULTURE, Nov. 1, 2015, at 382, 383–84.

87. *Id.* at 389.

88. MIGUEL MEDIALDEA, UNITED NATIONS ENV'T PROGRAMME, BEST PRACTICE GUIDELINES FOR AQUACULTURE AND SUSTAINABLE MANAGEMENT IN MEDITERRANEAN COASTAL WETLANDS: CASE STUDY OF DOÑANA MARSHES (ANDALUCIA, SPAIN) 18–19, 23 (2012), http://www.rac-spa.org/sites/default/files/doc_fish/guidelines_wetland_2012.pdf.

89. DR. LUTZ MÖLLER, UNITED NATIONS EDUC., SCIENTIFIC & CULTURAL ORG., WORLD NETWORK OF BIOSPHERE RESERVES (2016), <http://unesdoc.unesco.org/images/0023/002343/234319M.pdf>.

interdependent right to food and right to a healthy environment may require a common but differentiated approach depending on the existing capacity of a state to respect, protect, and fulfill the right to food.

States in the Global North might follow a pathway that begins with State investments in “good subsidies” to cover the initial startup costs of adopting agroecological or aquaecological approaches. New industry cooperatives could form to share risks associated with extreme weather and other environmental pressures on production. The cooperatives could encourage agroecological and aquaecological producers to become powerful interest groups that lobby for more environmentally-friendly production methods.

Today, agribusiness offers strident support for maintaining the status quo of the Green Revolution by relying on homogenized seeds and chemical inputs. Tomorrow, cooperatives pursuing ecological food production may offer counter-voices, promoting a new standard set of best practices that avoids chemical application, improves long-term soil quality, and reduces water usage.

States in the Global North can also explore new geographical approaches to food production. Much of the industrialization of food production is the product of efforts to concentrate food production on large tracts of rural land. New subsidies might be created in states with large amounts of under-utilized land, such as residential and business sites with clean and fertile soils that could produce food for local markets using agroecology methods. To build a culture of food production in cities and suburbs, national or provincial governments might provide tax credits that could be shared between landowners and farmers.

The Global South may require a different pathway to sustainable agriculture because a large sector of the population is hungry and food insecure. States in the Global South would benefit from a two-step approach. The first step would provide short-term investment to improve yields for communities that are food insecure. These investments should include better food storage to avoid post-harvest losses and improved seed and fertilizer inputs. To assure that farmers are financially capable of making the transition to and eventually assuming the risks associated with agroecological production, States should offer two sets of subsidies. The first set of subsidies will focus on improving immediate food yields. In the first stage of the program, these subsidies might cover 75–100% of the Green Revolution costs for synthetic fertilizers and improved seeds. Once yields that are sufficient to address immediate food insecurity are achieved, the annual chemical and seed subsidies would be phased out and replaced with subsidies to support natural fertilizers and plantings appropriate for agroecology. Creating community investment is key to achieving long-term agroecological

production so that there is an understanding of how incentives are structured. Developing community-based technical assistance may be critical to achieving long-term transitions as farmers learn from each other.⁹⁰ Improved cellular technologies may provide networking opportunities for food producers in the Global North and South to disperse technical assistance.

One such pilot program has been launched in Malawi, where chemical fertilizers were subsidized in 2005 to offset the 2004 food crisis. Nearly bankrupted by the long-term cost of these subsidies, Malawi launched a “subsidy to sustainability,” tying payment of chemical fertilizer subsidies to agroforestry improvements in biofertilizer trees.⁹¹ The Member States of the Common Market for Eastern and Southern Africa (COMESA) are currently pursuing the adoption of fertilizer trees as a prerequisite for receiving fertilizer subsidies.⁹²

CONCLUSION

In an interview in 1994, Nelson Mandela said that “freedom is meaningless if people cannot put food in their stomachs.”⁹³ Freedom is meaningless if this generation and the generations to come lack the fundamental resources to feed themselves because the current generation has squandered its resources. When one views food production in terms of human rights, it becomes apparent that the right to food is not a directive to produce food at any environmental cost. Rather, the right to food incorporates the right to a healthy environment. This means that food production must be sensitive to protecting environmental resources for this generation and future generations. The right to a healthy environment incorporates the right to food, meaning that food production must be appropriately factored into environmental land management. The right to food and the right to a healthy environment are not part of a hierarchy of rights but are interdependent rights. Existing practices of industrial agriculture jeopardize these dual rights.

As States plan for the future, it is obvious that transitions will be necessary to achieve green economy objectives. This Article proposes two legal interventions. First, States must be prepared to reform existing subsidies

90. De Schutter Report, *supra* note 70, at paras. 39–40.

91. Dennis Philip Garrity et al., *Evergreen Agriculture: A Robust Approach to Sustainable Food Security in Africa*, 2 FOOD SECURITY 197, 204 (2010).

92. Dennis Garrity, *Eastern and Southern African Countries Establish Initiative to Scale-Up Fertilizer Tree Technologies as a Component of Fertilizer Subsidy Programs*, EVERGREEN AGRIC. P'SHIP (Nov. 30, 2015), <http://evergreenagriculture.net/eastern-and-southern-african-countries-establish-initiative-to-scale-up-fertilizer-tree-technologies-as-a-component-of-fertilizer-subsidy-programs/>.

93. *FAO Lauds Nelson Mandela as Champion of Right to Food*, FAO, (Dec. 6, 2013), <http://www.fao.org/news/story/en/item/209581/icode/>.

that undermine environmentally sustainable food production. Second, States must invest in alternative approaches to food production, including agroecology and aquaecology. Some States, such as France, Denmark, and Spain, are creating legislative frameworks to ease the transition. But more States must follow if the actions of these few States are to achieve reliable food security in the face of increasing anthropogenic pressures on the environment. A shift to agroecology and aquaecology requires State financial commitment and time, and the time to initiate the Agroecological Revolution is now.