

THE INTERNATIONAL LEGAL REGIME FOR SUSTAINABLE SOIL

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1. INTRODUCTION

The ever-increasing demand for agricultural and other natural resources to meet the needs of the ever-growing human populations has had a devastating effect on global soil. In all regions of the world, soil has been ‘stripped, poisoned, suffocated, and abused.’¹ The impact on human existence ranges from food and water insecurity to denial of benefits of biodiversity, with their accompanying socio-economic and even political consequences, which often have trans boundary repercussions.² When measured on human timescale, the devastation is unalterable.³ Yet, this ‘living skin of the

Earth’⁴ does not seem to have got ‘the respect and attention it deserves’⁵ from global actors. Instead, it has earned the unenviable honour of being ‘the most underappreciated natural resource.’⁶ Although a few organizations, most notably the International Union of Soil Sciences and the International Union for the Conservation of Nature, have been calling for concrete action by the international legal community to protect the world’s soils for future generations, this call has not yet been heard or, perhaps better said, acted upon. To be clear, several international and regional environmental law instruments (both soft and hard, binding and non-binding) touch on the need to protect the sustainability of soil resources, there is no specific instrument dealing with soil as a freestanding subject in any comprehensive fashion. Yet, given the inevitability of soil to human existence and the ever-increasing devastation human actions are causing the world’s soil, the need for a freestanding comprehensive global treaty is both apparent and compelling.

The purpose of this chapter is to examine the existing international legal regime for the promotion of soil sustainability with a view to identifying gaps and deficiencies in the regime. In order to more fully demonstrate the need for an international treaty on soil, the next section of this chapter sets out in broad outline the essential functions of soil and describes the current state of the world’s soil. The section that follows explains the concept of sustainability in relation to soil. Thereafter, the international legal regime on soil, separated into binding and non-binding instruments, is reviewed. A case for a specific international treaty on soil is made in the penultimate section and recommendations are made for possible rules that should be considered in a future international treaty to protect the sustainability of the world’s soil. The last section concludes this discussion.

2. THE IMPORTANCE OF SOIL

While definitions of soil are abundant in the literature, the fundamental importance of soil to the global ecosystem is perhaps best captured by the following definition of soil proffered by the Council of Europe:

- 1 Alexandra Wyatt, ‘The Dirt of International Environmental Law Regarding Soils: Is the Existing Regime Adequate?’, (2008) 19 *Duke Environmental Law & Policy Forum* 165.
- 2 As we saw in many African countries in 2011, food insecurity in one country can be a threat to neighbouring countries, even to the international community as a whole, due to the mass production of refugees food crisis can cause. See, e.g., Peter Goodspeed, ‘Starving Somalis Flooding into Refugee Camps’, National Post (Ontario), 12 July 2011, online: <<http://fullcomment.nationalpost.com/2011/07/12/goodspeed-analysis-starving-somalis-flooding-into-refugee-camps/>> accessed 12 September 2014. See, also, Nicholas Fromherz, ‘The Case for a Global Treaty on Soil Conservation, Sustainable Farming, and the Preservation of Agrarian Culture’, (2012) 39 *Ecology Law Quarterly* 108 ‘[I]f enough nations suffer from food insecurity, the entire global food system is thrown off kilter. The pressure created by a food-insecure nation is two-fold: (1) other nations have to produce more to feed the people of the food-insecure nation; and (2) if other nations previously benefitted from the surplus of the now-insecure nation, they have to produce more or seek other sources to make up the difference.’
- 3 Ben Boer and Ian Hannam, ‘Legal Aspects of Sustainable Soil: International and National’ (2003) 12 *RECIEL* 2, 149.

- 4 Dan Yaalon, ‘Human-Induced Ecosystem and Landscape Processes Always Involve Soil Change’, (2007) 57 *Bio Science* 918. See, also, Alfred Hartemink, Stephen Nortcliff and David Dent, ‘Soil – The living Skin of the Earth’ International Union of Soil Sciences, (2009), online: <<http://www.alfredhartemink.nl/PDF/2008%20-%20Soil%20flyer%20IYPE.pdf>> accessed 12 September 2014.
- 5 Wyatt (n 1).
- 6 Fromherz (n 2), 63.

An integral part of the Earth's ecosystem and is situated at the interface between the Earth's surface and bedrock. It is subdivided into successive horizontal layers with specific physical, chemical and biological characteristics. From the standpoint of history of soil use, and from an ecological and environmental point of view, the concept of soil also embraces porous sedimentary rocks and other permeable materials together with the water that these contain, and the reserves of underground water.⁷

This definition is particularly useful because it captures the concept of land, which is more often considered in both legislation and literature than the narrower concept of soil. More so, the definition indicates that alterations of the soil process can affect the functioning of the ecosystem thereby creating problems in other environmental spheres.⁸ Thus, to better protect the ecosystem, the functions of soil, as well as the conservation and protection of soil, must be considered in the design of national and international legal frameworks for the protection of the environment.

Soil performs multifarious functions.⁹ It constitutes a habitat for humans, plants and organisms of multifarious kinds.¹⁰ Its nutrients are necessary for the maintenance of life.¹¹ Virtually every living organism on earth is dependent on soil for its sustenance. Thus, one of soil's most fundamental functions is food security. According to the World Health Organization, food security is a state in which 'all people at all times have

access to sufficient, safe, nutritious food to maintain a healthy and active life.'¹² Thus, it is a question of whether people get enough food to eat and whether the available food meets their nutritional needs. As Ginkel et al correctly puts it, food security is 'directly related to the ability of land to support its populations.'¹³ Wyatt regards food security as 'one of the most serious and frightening consequences of soil degradation', with global implications.¹⁴ Given the roughly 50 per cent estimated increase in global population by the year 2050 from 2000 level¹⁵ and the attendant increase in consumption levels, global food production will have to double to meet the population needs. This means that more fertile soil is needed to grow crops.

Soil protects other sectors of the environment by sieving pollutants before they enter the food chain. It protects the environment against flooding by absorbing considerable quantities of water.¹⁶ Although soil naturally erodes and degrades in its natural evolution, it also has a way of reforming itself and the history of the earth shows that soil formation exceeded its erosion. However, a combination of human factors has inverted this relationship.¹⁷ Those factors include overgrazing, deforestation the use of chemical substances (such as fertilizers and pesticides) during agriculture, disposal of organic toxic substances, and the increase of greenhouse gas emissions.¹⁸

Given the aforementioned functions of soil, it goes without saying that the quality of soils dictates the degree to which they can provide habitats for both humans and flora and fauna and provide nourishment for our crops. Soil degradation – 'a process which lowers the current and/or the potential capability of the soil to produce goods and services'¹⁹ – therefore has enormous impact on agriculture. According to National Geographic,

7 Council of Europe, Recommendation No R (92) 8 of the Committee of Ministers to Member States on Soil Protection (Adopted by the Committee of Ministers on 18 May 1992 at the 476th meeting of the Ministers' Deputies), Appendix A, online: <<https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGet&Instrane-tImage=574333&SecMode=1&DocId=603128&Usage=2>> accessed 14 August 2014.

8 Boer and Hannam (n 2), 151. See, also, Ian Hannam & Ben Boer, 'Legal and Institutional Frameworks for Sustainable Soils: A Preliminary Report', IUCN Environmental Policy and Law Paper No. 45, 2002, p 10, online: <<https://portals.iucn.org/library/efiles/documents/EPLP-045.pdf>> accessed 16 September 2014.

9 For a comprehensive list of soil functions essential for food production and wider societal or ecosystem functions, see David Powlson et al, 'Soil Management in Relation to Sustainable Agriculture and Ecosystem Services', (2011) 36 *Food Policy* 1, 73.

10 According to the Food and Agricultural Organization (FAO), 'Soil is one of the most diverse habitats on earth and contains one of the most diverse assemblages of living organisms. Nowhere [else] in nature are species so densely packed ... [A] single gram of soil may contain millions of individuals and several thousand species of bacteria,' as well as fungi and larger organisms.' FAO, FAO Soil Portal: Facts and Figures, 2014, online: <<http://www.fao.org/soils-portal/soil-biodiversity/facts-and-figures/en/>> accessed 12 July 2014.

11 John Quinton et al, 'The Impact of Agricultural Soil Erosion on Biogeochemical Cycling' (2010) 3 *Nature Geoscience* 311.

12 World Health Organization (WHO), Food Security, (WHO, 2014), online: <<http://www.who.int/trade/glossary/story028/en/>> accessed 16 September 2014.

13 Hans Van Ginkel et al, *Human Development and the Environment: Challenges for the United Nations in the New Millennium* (United Nations University Press, 2002) 246.

14 Hal Kane, *The Hour of Departure: Forces that Create Refugees and Migrants* (Worldwatch Institute, 1995) 10–14. See also, Wyatt (n 1), 172.

15 UN Department of Economics and Social Affairs, Population Division, *World Population Prospects: The 2006 Revision*, 8, UN Doc ST/ESA/SER.A/261/ES (2007), online: <<http://www.un.org/esa/population/publications/wpp2006/English.pdf>> accessed 16 September 2014.

16 Alexander Kiss and Dinah Shelton, *International Environmental Law* 3rd ed. (Ardsley, NY: Transnational Publishers Inc, 2004) 443.

17 *Ibid.*

18 *Ibid.*, 443–444. See, also, Hannam and Boer (n 8) 13.

19 Ian Hannam, 'Ecologically Sustainable Soil: The Role of Environmental Policy and Legislation' in Diane Scott, Rabi Mohtar and Gary Steinhardt, (eds.), *Sustaining the Global Farm – Selected Papers from the 10th International Soil Conservation Organization Meeting, May 24–29, 1999* (International Soil Conservation Organization/USDA / Purdue University, 2001) at 95.

soil degradation is “the root of all socioeconomic problems” in developing countries.²⁰ It has been reported that since World War II, soil degradation has lowered global agricultural productivity by approximately 13 per cent.²¹ Former UN Secretary-General Kofi Annan reported that:

[n]early 2 billion hectares of land, an area about the combined size of Canada and the United States, is affected by human-induced degradation of soils, putting the livelihoods of nearly one billion people at risk Each year an additional 20 million hectares of agricultural land either becomes too degraded for crop production, or becomes lost to urban sprawl.²²

Unfortunately, despite the countless uses of soil and the untold consequences of soil degradation, soil has never received the same degree of attention as other natural resources. As Radford puts it, this is because soil is considered ‘less spectacular’²³ than other natural resources and other global problems. Lacy opines similarly that this is ‘perhaps because the soil resource is less glamorous than endangered species, less conspicuous than toxically polluted waters or clear cut forests, or less politically divisive than *cowburnt* rangelands’.²⁴ But the adverse consequences of soil degradation on global food security alone, not to mention the threat to biodiversity, a common concern of mankind because of the immense global benefits flowing from it²⁵ mandate international efforts at promoting soil sustainability.

20 State of the Planet: A World Transformed, *National Geographic* (July 2002).

21 Kiss and Shelton (n 16).

22 UN General Assembly, *We the Peoples: The Role of the United Nations in the Twenty-first Century – Report of the Secretary-General, Fifty-fourth session Agenda item 49 (b) The Millennium Assembly of the United Nations*, A/54/2000, 27 March 2000, 47, online: <<http://unpan1.un.org/intradoc/groups/public/documents/un/unpan000923.pdf>> accessed 12 July 2014 - (noting that ‘[t]he major culprits are irrigation-induced salinization, soil erosion caused by overgrazing and deforestation, and biodiversity depletion. The direct cost alone, in terms of annual income forgone, has been estimated at more than \$40 billion a year.’).

23 Tim Radford, ‘Soil Erosion as Big a Problem as Global Warming, Say Scientists’, *Guardian*, 14th February, 2004, online: <<http://www.theguardian.com/world/2004/feb/14/science.environment>> 12 July 2014.

24 Peter M Lacy, ‘Note, Our Sedimentation Boxes Runneth Over: Public Lands Soil Law as the Missing Link in Holistic Natural Resource Protection’, (2001) 31 *Environmental Law* 433 at 437.

25 David Hunter, James Salzman and Durdwood Zaelke, *International Environmental Law and Policy* (3rd ed), (New York: Foundation Press, 2007) 1023.

3. THE CONCEPT OF SOIL SUSTAINABILITY

Efforts to understand the concept of soil sustainability must first bring us to the well-known concept of sustainable development, that organizing principle of human life defined by the Bruntland Commission Report as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’²⁶ The concept has three essential aspects: economic sustainability, social sustainability and environmental (or ecological) sustainability,²⁷ none of which is to be compromised in order to promote the other. But the definition can be divided into two: the needs of the present generation and the needs of future generations. According to Vallance, Perkins and Dixon, ‘it is only when people’s basic needs are met that they can begin to actively address biophysical environmental concerns’.²⁸ This suggests that the ability of the present generation to meet the needs of future generations is dependent on its ability to meet its own present needs. The principle of sustainable development serves as a check on the present generation, requiring it to consider the needs of future generations in its quest to meet its own present needs.

What this means in practice depends on the specific context in which it is to be applied. In the context of soil, sustainable development would mean the harnessing or exploitation of soil resources in a way that does not undermine the capacity of the soil to serve the needs (such as food security and habitation) of the present generation while also retaining the capacity to meet the needs (both food security and habitation as well as other needs that might be affected by soil degradation) of future generations. As Hannam and Boer put it, sustainable use of soil is ‘the use of soils in a manner that preserves the balance between the processes of soil formation and soil degradation, while maintaining the ecological functions and needs of soil.’²⁹

26 *Report of the World Commission on Environment and Development: Our Common Future*, 1987, para 1, (Transmitted to the General Assembly as an Annex to Document A/42/427 – Development and International Co-operation: Environment), online: <<http://www.un-documents.net/our-common-future.pdf>> accessed 22 August 2014.

27 Joseph Fiksel, Tarsha Eason & Herbert Frederickson, ‘A Framework for Sustainability Indicators at EPA’, United States Environmental Protection Agency, October 2012, online: <<http://www.epa.gov/sustainability/docs/framework-for-sustainability-indicators-at-epa.pdf>> accessed 12 August 2014.

28 Suzanne Vallance, Harvey Perkins and Jennifer Dixon, ‘What is Social Sustainability? A Clarification of Concepts’, (2011) 42 *Geoforum* 3, 344.

29 Hannam and Boer (n 8) 22.

Writing in relation to agricultural soil, Kassam *et al* state that there cannot be sustainability unless 'field soil health and productive capacity are kept at an optimum to provide ecosystem services such as provision of clean water, hydrologic and nutrient cycling, habitats for microorganisms and mesofauna, carbon sequestration, and climate regulation'.³⁰ Das *et al* state that soil sustainability can be achieved 'by the manipulation of soil physical, chemical as well as biological properties in such a beneficial manner that helps to produce fertile soils without causing severe or irreversible damage to the ecosystem'.³¹ Any production system that permits the disruption of soil structure and quality and consequently ecosystem services cannot be considered sustainable.³² The aim of soil sustainability is thus to reverse the trend of soil degradation. Hannam and Boer suggest three key points that must be addressed in soil legislation to incorporate the concept of sustainability:

- i. What aspects of the soil environment have to be sustained (e.g., the level of soil nutrients, the biological diversity of the ecosystem)?
- ii. Over how long is the land use activity to be sustainable (a few years, several decades, perpetuity)?
- iii. Over what area is the sustainable use of soils sought (a community, a region, and across State borders)?³³

To promote soil sustainability and thereby accommodate the objectives of sustainable development, significant changes to the existing legal regimes on soil are required.

4. THE INTERNATIONAL LEGAL REGIME FOR SOIL

More than 200 instruments have been developed to protect the world's natural environments and natural resources.³⁴ However, as Kiss and

Shelton observe, 'legal protection for soil is rather recent'.³⁵ Only the more recent instruments contain elements that can contribute to soil sustainability. Even then, the relationship of the principal goals of those instruments to soil sustainability is rather tangential. International environmental actors considered soil sustainability as mainly a domestic problem without global reach. As a result, international cooperation did not begin at the same time as cooperation in other sectors of the environment began.³⁶ This legal neglect has been ascribed to 'a general perception of soil as an inexhaustible resource'.³⁷ It has led to the present state of affairs in which there is no international legal instrument addressing the protection of soil sustainability specifically and holistically. Considered below is the general nature of the multilateral instruments touching on soil sustainability. The focus is only on those instruments most related to soil.

Non-Binding instruments

The early multilateral environmental instruments bearing on soil sustainability were non-binding. They consist of declarations of principles, action plans, guidelines and codes of practices relating to soil. They formed the essential initial steps in the build of international consensus on the need for binding treaties. Despite their non-binding nature, they are nevertheless important instruments, having been negotiated carefully and in good faith.³⁸ The earliest of those instruments appears to be the European Soil Charter adopted in 1972 by the Committee of Ministers of the Council of Europe.³⁹ This was followed by the World Soil Charter (developed conjunctively with the World Soils Policy) and adopted by the United Nations Food and Agriculture Organization on November 25, 1981.⁴⁰ These two instruments contained non-binding guidelines for action and basic principles on soil conservation. The World Soil Charter, for instance, which was negotiated by the Food and Agricultural Organization and the UN Environment Programme, 'rais[ed] the profile of soil conservation as

30 Amir Kassam *et al*, 'Sustainable Soil Management Is More than What and How Crops Are Grown' in Rattan Lal and Bobby Stewart (eds.), *Principles of Sustainable Soil Management in Agroecosystems* (Florida: CRC Press, 2013) 338.

31 Indranil Das *et al*, 'Soil Sustainability: An Important Step Towards Resource Conservation' (2010) 14 SATSA Mukhapatra – Annual Technical Issue 124.

32 Kassam *et al*, (n 30) 354.

33 *Ibid*, 21-22.

34 Ben Boer, 'Law for Sustainable Soils: International and National Aspects' (2010) Bulletin of the Serbian Geographical Society No 4, p 1, online: <<http://www.doiserbia.nb.rs/img/doi/0350-3593/2010/0350-35931004001B.pdf>> accessed 16 July 2014.

35 Kiss and Shelton (n 16) 444.

36 *Ibid*.

37 *Ibid*.

38 Patricia Birnie and Allan Boyle, *International Law and the Environment* (Oxford: Oxford University Press, 2002), 24-25.

39 Committee of Ministers, Council of Europe, European Soil Charter, Resolution (72) 19 (30 May 1972).

40 Food and Agricultural Organisation, United Nations, World Soil Charter, 25 November 1981, 21 FAO Conf. Res. 8/81.

an international environmental management issue' and provided 'relatively straightforward guideline material' that would enable States to prepare their domestic laws and policies.⁴¹ It calls for the need for land-use policies that create incentives for people to participate in soil conservation, taking into account both the technical and socio-economic elements of effective land use.⁴² The principles contained in the Charter are however considered inappropriate for the 21st century, as they do not align with modern environmental management concepts and 'fall well short' of modern needs.⁴³

Other non-binding instruments include the World Charter for Nature,⁴⁴ Agenda 21,⁴⁵ the World Conservation Strategy,⁴⁶ and the Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests.⁴⁷ Although these instruments address issues applicable to soil and its functions, their usefulness is very limited because their provisions are for the most part too broadly worded to be of any tangible value to effectively address soil sustainability.

Binding instruments

The first binding instrument bearing close relevance to soil sustainability and conservation is the Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa.⁴⁸ The definition of desertification under the convention speaks to the convention's relevance to soil sustainability: 'land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.'⁴⁹ As the title of the convention clearly suggests, the convention has limited application thematically and to some extent geographically. Thematically, it is limited to countries experiencing desertification. Geographically, there is an explicit emphasis on the African

continent and throughout the text of the convention there is a constant reference to 'affected developing countries'. This geographical limitation was informed, ostensibly, by the desertification problems that many developing countries, particularly in Africa, were experiencing at the time of the enactment of the convention, which might have been absent in other continents.

The fact that other countries also experience desertification, even if on a lower scale, is regrettably overlooked. In addition, the convention does not create binding obligations *per se*, but is mainly a 'capacity-building' treaty that 'focuses on process and a bottom-up approach'.⁵⁰ Thus, the convention enjoins State parties affected by desertification to establish National Action Programs to combat it and to mitigate its effects.⁵¹ Developed countries are enjoined to support the affected developing countries in doing so.⁵² But the convention's greatest limitation with regard to soil sustainability is perhaps the fact that its elements have limited application to soil. Thus, soil is not recognized as 'an individual ecological element.'⁵³

A second important binding instrument is the Convention on Biological Diversity⁵⁴ with the object of protecting the intrinsic value of global biodiversity and to encourage the sustainable use of biological resources and the equitable sharing of benefits arising out of the utilisation of genetic resources as well as traditional knowledge and technology relevant to the conservation of biodiversity.⁵⁵ Such values include 'ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values'.⁵⁶ Biodiversity is defined as 'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'⁵⁷ This definition is broad enough to encompass soil since it is an important source of biodiversity. But something explicit is required, given calamity surrounding global soil.

Notably, the convention provides a vital theoretical rationale for global action on soil conservation.⁵⁸ The convention calls for international cooperation that must include information exchange. Although there is no explicit

41 Hannam & Boer (n 8) 61.

42 United Nations Environment Programme, *UNEP's Strategy on Land Use Management and Soil Conservation – A Strengthened Functional Approach*, UNEP Policy Series no 4, 2004, 7, online: <<http://www.unep.org/pdf/UNEP-strategy-land-soil-03-2004.pdf>> accessed 10 June 2014.

43 Hannam and Boer (n 8), 61.

44 28 October 1982, UN GA, A/RES/37/7.

45 United Nations Conference on the Environment and Development, Agenda 21, UN Doc A/CONF.151/4 (1992).

46 International Union for Conservation of Nature and Natural Resources, *World Conservation Strategy: Living Resource Conservation for Sustainable Development*, 1980, online: <<https://portals.iucn.org/library/efiles/html/WCS-004/cover.html>> accessed 10 June 2014.

47 UN Doc A/Conf.151/6/Rev.1, 31 ILM 881 (1992).

48 33 ILM 1328 [Desertification Convention] 17 June 1994.

49 *Ibid*, article 1, para (a).

50 Wyatt (n 1) 181.

51 Desertification Convention (n 48), articles 9-10.

52 *Ibid* art 6.

53 Hannam and Boer (n 8), 63.

54 1760 UNTS 79, 5 June 1992.

55 *Ibid*, article 1.

56 *Ibid*, Preamble, para 1.

57 *Ibid* art 2.

58 Hunter, Salzman and Zaelke (n 25) 1022-1023.

mention of soil in the convention, at the 2003 Conference of the Parties (COP), an *ecosystem approach* to biodiversity was adopted. An ecosystem approach is described as a 'strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way'.⁵⁹

Thus, through the approach, the three pillars of the convention: conservation, sustainable use and equitable sharing of benefits, are to be implemented. With the express mention of land in the ecosystem approach, Wyatt rightly observes, greater recognition of the need for the protection of soil would seem to have been assimilated into the convention.⁶⁰ Before the 2003 COP, the Food and Agricultural Organisation had developed for the convention a Programme of Work on Agricultural Biodiversity, which the COP adopted in 2000. Although the Programme encompassed soil biodiversity, during a 2007 review, soil biodiversity was explicitly incorporated as a distinct international initiative.⁶¹

Relevant also are the UN Framework Convention on Climate Change⁶² and the Kyoto Protocol subsequently attached to it.⁶³ Both instruments address the sources of greenhouse gases (GHGs), the consequences of emissions and strategies needed to address them. The definitive objective of the UNFCCC is stated as the 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'⁶⁴ Changes in land use have been identified as a primary source of GHGs.⁶⁵ A great part of the earth's carbon is located in soil. The main agricultural activities that affect GHG emissions are deforestation, biomass burning, use of nitrogenous fertilizers and organic manure, and livestock grazing. Deforestation, a major cause of soil degradation, is a key concern of the UNFCCC because it intensifies the emission of gases from terrestrial and aquatic ecosystems to the atmosphere.⁶⁶ However,

because of its primary focus on GHG emissions from the industrial sector rather than the non-industrial and agricultural land use sectors, the UNFCCC is considered an ill-suited vehicle to address soil protection.⁶⁷

The Kyoto Protocol would have been a better vehicle, even though soil is not its priority,⁶⁸ but for its expiration in 2012. It creates a responsibility for State parties to undertake agricultural practices that do not exacerbate climate change. It directs State parties to decide whether and how 'changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soil and land use change and forestry categories, shall be added to, or subtracted from, the assigned amounts' for net emissions targets under Annex I.⁶⁹ It promotes technological developments to implement carbon capture and storage (CCS). However, specific legal instruments would need to be developed to manage CCS as part of the overall goal of soil sustainability.⁷⁰ Wyatt has noted, however, that there exists nevertheless great potential for soil protection in the UNFCCC regime through the inclusion of biochar in the rules governing clean development mechanisms⁷¹ – one of the principles established under the UNFCCC regime but which currently excludes CCS projects in agricultural soil.⁷²

At the regional level, a number of instruments impact soil sustainability, even more directly than international instruments. They include the 1968 African Convention on the Conservation of Nature and Natural Resources,⁷³ the 1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region,⁷⁴ and the 1998 Protocol for the Implementation of the Alpine Convention of 1991 in the Area of Soil Protection.⁷⁵ The African Convention contains an article on land and soil requiring States to 'take effective measures to prevent land degradation, and to that effect shall develop long-term integrated strategies for the conservation and sustainable management of land resources, including soil,

59 Convention on Biological Diversity, Nairobi, Kenya, 15–26 May 2000, *COP 5 Decision V/6*, online: <<http://www.cbd.int/decision/cop/default.shtml?id=7148>> accessed 10 June 2014.

60 Wyatt (n 1) 184.

61 Convention on Biological Diversity, *In-depth Review of the Programme of Work on Agricultural Biodiversity: The International Organizations' Contribution to the Implementation of the Programme of Work on Agricultural Biodiversity: How Far Have We Come?*, UN Doc. UNEP/CBD/SBSTTA/13/INF/2, 29 November 2007, 14–19, online: <<http://www.cbd.int/doc/meetings/sbstta/sbstta-13/information/sbstta-13-inf-02-en.pdf>> accessed 19 June 2014.

62 9 May 1992, 1771 UNTS 107 [UNFCCC].

63 Agreement for the Kyoto Protocol to the United Nations Framework Convention on Climate Change, 11 December 1997, 37 ILM 22.

64 UNFCCC, (n 62) art 2.

65 Hannam and Boer (n 8) 64.

66 *Ibid* 64–65.

67 *Ibid* 65.

68 Wyatt (n 1), 186.

69 Kyoto Protocol, (n 63), article 3, para 4.

70 Hannam and Boer (n 8) 65.

71 Wyatt (n 1) 186.

72 *Ibid*, see also Frédéric Forge, 'Carbon Sequestration by Agricultural Soil', Canadian Parliamentary Research Branch, 30 January 2001, 6, online: <<http://publications.gc.ca/collections/Collection-R/LoPBdP/PRB-e/PRB0038-e.pdf>> accessed 22 June 2014. (noting that 'Unlike reforestation, carbon sequestration in agricultural soil was not included in the original Kyoto Protocol; in other words, soils are not officially recognized as carbon sinks, and carbon stored in soil cannot be factored into a country's emissions budget').

73 1001 UNTS 3 (Revised in 2003) 15 September 1968, [African Convention].

74 26 ILM 41 (1987) 24 November 1986.

75 2005 OJ (L 337) 29, 16 October 1998, [Alpine Protocol].

vegetation and related hydrological processes.⁷⁶ The South Pacific Region Convention enacted to protect the marine environment from pollution in the South Pacific States, contains provisions on soil protection, particularly in relation to the effects of land-based soil degradation on the marine environment.⁷⁷ The Alpine Protocol, regarded as the only binding instrument in the world specifically addressing soil protection,⁷⁸ has as its main object the reduction of 'damage to soil through the use of appropriate agricultural and forestry land use methods that do not harm the soil.'⁷⁹ It promotes minimal use of soil,⁸⁰ rehabilitation of degraded soil,⁸¹ and protection of soil for agriculture and forestry⁸² and against pollutants⁸³ and impacts of tourism.⁸⁴

5. A CASE FOR A SPECIFIC INTERNATIONAL INSTRUMENT TO PROMOTE SOIL SUSTAINABILITY

A cursory glance at the sheer number of instruments touching on soil might yield the conclusion that a comprehensive framework for the protection of global soil already exists in international law. However, from the foregoing review, it is evident that apart from the Alpine Protocol, there currently exists no particular international instrument that addresses in any comprehensive manner the issue of protecting the sustainability of the world's soil. Even an integrated view of all the instruments cannot produce such a comprehensive framework as is needed to protect the world's soil. And the Alpine Protocol itself being a regional instrument applicable only to eight States, it is accurate to say that 'our soil resources remain largely unprotected.'⁸⁵ With the increasing devastation of the world's soils by

76 African Convention, (n 73), article VI(I).

77 See, for instance, articles 5, 7 and 23 of the Convention.

78 Hannam and Boer (n 8) 68.

79 *Ibid.*

80 Alpine Protocol, (n 75), art 7.

81 *Ibid* art 10.

82 *Ibid* art 12.

83 *Ibid* art 15.

84 *Ibid* art 14. Other binding regional instruments relevant to soil include: the Convention Concerning the Protection of the European Alps, the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, Convention for the Protection of the Mediterranean Sea Against Pollution, the Benelux Convention on Nature Conservation and Landscape Protection, the Convention Establishing a Permanent Inter-State Drought Control Committee for the Sahel, the Association of South East Asian Nations Agreement on the Conservation of Nature and Natural Resources, the Agreement for the Establishment of the Arab Centre for the Studies of Dry and Barren Land.

85 Fromherz (n 2), 104.

human actions and the consequent threat to global food security,⁸⁶ indeed the inevitability of soil for human existence on earth, it need not be specially emphasized that an international instrument that provides an adequate and effective regime for soil sustainability is urgently needed.

Certainly special benefits of an international instrument should be specifically pointed out. International legal action on soil will give soil the legal visibility that it deserves and put pressure on all actors to take proactive action to address soil protection.⁸⁷ It will facilitate information-sharing and scientific knowledge transfer among States, vital for effective environmental protection of all kinds. It will also induce developed countries and international financial institutions to make funding available to developing countries to enable them undertake soil conservation efforts while simultaneously ensuring that the wealthy countries, which contribute substantially to global soil degradation through the activities of their multinational corporations and which thus benefit from it bear the costs of remedial measures.⁸⁸ An instrument need not take any particular form or shape. It could be a new freestanding treaty negotiated at the international level and supplemented at the regional level. It could be a protocol to any of the existing conventions touching on soil, such as the Biodiversity Convention or the Desertification Convention or a technical annex thereto.⁸⁹ It could also include non-binding guidelines that set out the various actions that State parties should take to protect soil sustainability. However, non-binding guidelines should only serve to supplement binding mechanisms and not to be considered an alternative.

Some commentators have argued that regional instruments might be preferable to purely international instruments for tackling environmental problems like climate change or soil protection.⁹⁰ Based on a 'dynamic game-theoretic model', they argue that 'two agreements can sustain a larger

86 As Narula has observed, 'the notion that hunger and poverty can today be fully explained in terms of national and local factors is a fallacy.' Smita Narula, 'The Right to Food: Holding Global Actors Accountable Under International Law', (2006) 44 *Columbia Journal of Transnational Law* 691, 697.

87 Wyatt (n 1), 192–193. See, also, Els Wynen, *A UN Convention on Soil Health or What Are the Alternatives?* (2002) Proceedings of the 14th IFOAM Organic World Congress, Victoria Canada, August 2002, 27–29.

88 Hunter, Salzman and Zaelke (n 25), 128–137.

89 The Biodiversity Convention will probably be the most appropriate instrument given its preoccupation with biodiversity and the richness of the soil's biodiversity and its impact on the ecosystem.

90 Geir Asheim *et al*, 'Regional versus Global Cooperation for Climate Control', (2006) 5 *Journal of Environmental Economics and Management* 1, 93–109.

number of cooperating parties than a global treaty'.⁹¹ Given the political obstacles barring the negotiation of a new climate treaty to replace the Kyoto Protocol, negotiations at the regional level may be more realistic. But the downside is that it may produce treaties that may not create the level of obligations many developing countries desire given the nature of interests driving global climate politics.

Fromherz has developed a number of issues that any international instrument specifically focusing on soil must address: urban growth boundaries, erosion control, irrigation, and nutrient depletion control, and restrictions on contamination.⁹² Treaty parties must commit to limit the expansion of urban areas. They must commit to enact legislation, adapted to the physical characteristics of their region, outlawing land use practices that contribute to erosion.⁹³ They must commit to adhere to the following irrigation principles: consistent monitoring of water and saline content of soil 'to ensure efficient use of water resources and as an early warning system for salinization issues'; use of 'drip irrigation', where feasible, instead of the conventional 'sprinkler irrigation'; and judicious use of waste water; installation of adequate drainage systems to prevent salts and trace elements flowing into areas they would cause environmental harm.⁹⁴ States must commit to monitor and report on the state of their soils. To enhance the capacity of such reporting and encourage good ecological practices through its shaming effect, such information should be made publicly available.⁹⁵ An international soil treaty must also impose restrictions on the use of contaminants.⁹⁶ To ensure the efficacy of these measures, States must commit to establish within their domestic legislation penalties for failure by business enterprises to follow prescribed standards of soil use.

In addition, international soil treaty must require States to commit to explicitly include soil impacts in their environmental impact assessment legislation. The principle of public participation must be enshrined into such laws, as well as in land use decision-making generally. The legal framework must promote the identification of persons or groups who are socio-economically and ethnically disadvantaged by soil degradation and set out the

obligations of States to such persons or groups.⁹⁷ The feasibility of a binding international soil convention has been questioned. Between 2000 and 2001, Wynen interviewed personnel of a range of international agencies, including FAO and UNEP on their views about the creation of an international soil convention. She reported a 'lack of enthusiasm' among them to push for an international convention.⁹⁸ She therefore suggested that efforts toward creating non-binding mechanisms would be more realistic.⁹⁹

To be sure, non-binding mechanisms are easier to negotiate, but they score low in effectiveness. Vanheusen and Bragadóttir have observed in a leading report that, "soft law measures concerning soils have been in place for a considerable period but have not led to sufficient protection of soils against erosion, compaction, sealing, contamination and other soil threats".¹⁰⁰ The report called on the IUCN to push forward its work on the Draft Protocol for the Protection and Sustainable Use of Soil to facilitate the process for the development of a binding international instrument.¹⁰¹ Given the IUCN's central role in global soil protection to date, it stands a chance of convincing government representatives and other international agencies, in particular the FAO, to on the need to negotiate a binding international soil law.

6. CONCLUSION

Promoting soil sustainability is the most effective way of boosting agricultural productivity and thus addressing the current food security crisis threatening the whole world. Global crisis requires global response. Even if individual States had the capacity to establish and implement legal mechanisms for the promotion of soil sustainability, in the absence of binding international legal mechanisms, there is not sufficient motivation for them

91 *Ibid.*
92 Fromherz (n 2) 110–112.

93 *Ibid* 110.

94 *Ibid* 110–111.

95 *Ibid* 111.

96 *Ibid.*

97 Ian Hannam and Ben Boer, *Drafting Legislation for Sustainable Soils: A Guide*, (2004) IUCN Environmental Policy and Law Paper No 52, 34, online: <<https://portals.iucn.org/library/efiles/documents/EPLP-052.pdf>> accessed 12 July 2014.

98 Wynen (n 87) 33–34.

99 *Ibid* 38.

100 Bernard Vanheusen and Hrafnhildur Bragadóttir, 'Report of Working Group 5 on Capacity Building Approaches in Legislation and Policy Development Technique', in Harriet Bigas et al (eds), *Society and Global Change: Proceedings of the International Forum Celebrating the Centenary of Conservation and Restoration of Soil and Vegetation in Iceland, 31 August - 4 September 2007, Selfoss, Iceland* (European Commission, 2009) 188, online: <<http://www.land.is/english/images/pdf-documents/eur23784.pdf>> accessed 21 June 2014.

101 *Ibid.*

to do so. Arguably, developing countries lack the ability to adequately regulate their own business practices that cause soil degradation, because transnational corporations, whose influence developing countries cannot withstand, conduct these business practices. The cooperation of developed countries is therefore needed. There is probably no better way of ensuring this cooperation than through the agency of international law. Moreover, international legal action on soil will give soil the legal visibility that it deserves and put pressure on all actors to take proactive action to address soil sustainability. The need for coordinated international legal action can thus not be over-emphasized.