Theory for Sustainable Development: Towards or Against?

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PREFACE

This article explores the methodology of environmental law. It was originally authored by Staffan Westerlund in 2008. Westerlund (1942–2012) was a Professor of environmental law at Uppsala University, Sweden. He was critical of legal scholarship that places the hierarchy of norms, principles and their interpretation at the centre of legal reasoning and deduction. He called this the reactive approach to addressing new or emerging issues. By contrast, a proactive approach would focus on the nature of the issue first before looking for legal solutions. Perhaps more than other legal disciplines, environmental law requires a multidisciplinary methodology to understand what is meant by "environmental". According to Westerlund, environmental legal scholarship has, for too long, overlooked the "core problem" and failed to focus on ecological sustainability as the prerequisite for sustainable development and overall purpose of environmental law.

The purpose of this republication of Westerlund's article is to provide readers, especially students, with a useful research and study tool to better understand environmental law methodology. To this end, Westerlund's original

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publication has been substantially edited and annotated by: (a) using the footnotes (and some limited in-text changes) to update and explain concepts, with selected references to new material and scholarship; (b) improving the English phrasing and readability; and (c) making corrections, including where references were missing or incomplete. **Bold text is used in the footnotes to indicate where the annotator has added information and references to aid the reader.** Westerlund's original arguments remain unchanged. Recent developments serve to both reinforce the essential veracity of his arguments 15 years after they were made. However, these developments also demonstrate that the law now has a range of new perspectives and tools at its disposal that could be (and in some cases are) used to meet Westerlund's key objective for the law — that is, achieving and maintaining ecological sustainability.

This article discusses the ongoing degradation of the biosphere as demonstrated by human population growth and declining biodiversity. It discusses the fact that no national or international environmental control system has achieved a legally secured ecological sustainability. This article recognises that human life as well as economies depend on nature and consequently ecological sustainability. The concept of core problem is fundamental for this article. The core problem recognises that achieving and maintaining ecological sustainability is necessary for sustainable development. This puts environmental law in focus. However, most environmental law research over the last 35 years has been reactive — mainly studying law as is and as applied — while the achievement and maintenance of ecological sustainability calls for proactive research aimed at solving global and regional sustainability problems. The answer to the overall question posed in the title of this article is that reactive environmental legal research — especially if carried out within or under pre-environmental or old environmental paradigms — serves to obstruct the development of theory for sustainable development.

1. INTRODUCTION

Environmental law as an academic discipline has not achieved anything of significance for ecological sustainability. We can see this when assessing environmental laws around the world, research projects and programmes,

and theoretical frameworks and paradigms.[1] For example, the Resource Management Act 1991 (RMA) of New Zealand aims to promote sustainable management and has an extensive area of applicability.[2] However, no genuine sustainable success has been reported.[3] One of the RMA's several flaws was that the constructed system was not fully launched.[4] For example, national policy statements were either not issued or vaguely formulated when issued,[5]

1 **In 2017, Michael Howes and others reviewed 94 different studies from various countries, and argued that despite efforts to achieve environmental sustainability, a significant contributing factor to the ineffectiveness of these efforts is a failure in policy implementation. The authors provided three reasons for this failure. First, ongoing economic incentives push for the exploitation of natural resources. Second, governments lack capacity or political will to implement effective sustainability policies. Third, key stakeholders do not understand the seriousness of sustainability issues and the urgent need for change. Michael Howes and others "Environmental Sustainability: A Case of Policy Implementation Failure?" (2017) 9(2) Sustainability 1.**

2 **The Resource Management Act 1991 [RMA] applies to the management of land, air, water and their interactions. It uses an expansive definition of environment which encompasses ecosystems including people and communities: RMA, s 2 definition of "environment". Section 5(1) states the purpose of the RMA, which "is to promote the sustainable management of natural and physical resources". Section 5(2) defines "sustainable management".**

3 **Recent official government reports highlight significant decline in most ecosystem and environmental indicators in New Zealand. See, for example, Ministry for the Environment and StatsNZ *Our land 2021: New Zealand's Environmental Reporting Series* (ME 1555, April 2021). Similar reports track the overall decline of coastal marine ecosystems.**

4 **For recent and comprehensive critiques of the New Zealand resource management system's failure to achieve sustainable management see Environmental Defence Society *Evaluating the environmental outcomes of the RMA* (June 2016); and Resource Management Review Panel *Transforming the resource management system: Opportunities for Change* (Issues and Options Paper, November 2019). Key failures include: a lack of clear environmental bottom lines; a lack of clarity on how to apply the sustainable management purpose; a focus on managing the negative effects to resources rather than providing a positive approach on how to achieve better environmental outcomes; a lack of effective integration across the resource management system including inadequate national direction; insufficient recognition of the Treaty of Waitangi; and weak compliance, monitoring and enforcement with the current system, which allows for weak accountability arrangements and oversight. Resource Management Review Panel, above n 4, at 13–19.**

5 **National policy statements create objectives and policies on matters of national significance, which are relevant to achieving the core purpose: sustainable management. They are created by central government to guide or prescribe coherent policy and regulation at subnational levels. Environment Foundation "National Policy Statements" (updated 4 January**

which in turn makes their full legal operationalisation virtually impossible.[6] A comprehensive review of the resource management system in New Zealand recently led to a government decision to reform the system and replace the RMA with new law.[7]

Environmental legal research has — to an overwhelming degree — been reactive and does not relate to problems of sustainability.[8] I shall substantiate and elaborate on this claim in this article, while suggesting a concept of core

2018) Environment Guide <www.environmentguide.org.nz>; and RMA, ss 45 and 55.

6 **Legal operationalisation is an environmental law methodology stating that "[i]f a goal or an environmental standard is to be binding and legally effective, it must therefore be transformed into enforceable law" (footnotes omitted): Inga Carlman "The Resource Management Act 1991 Through External Eyes" (2007) 11 NZJEL 181 at 186.** Carlman argues, among other things, that, according to the RMA, national policy statements are legally binding and there is a hierarchy of planning instruments in place, which in principle should be sufficient for legal operationalisation, but adds that issuing such statements is not mandatory except with respect to coastal areas. Nor are such statements precise, which creates severe problems with respect to legal operationalisation for sustainability. The RMA does not contain much substantive law. This seems to leave considerable room for discretion in the implementation of environmental policy and decision-making on the use of land, air and water resources. All in all, the RMA reflects sustainability (by using a sustainable management purpose or objective) and includes means to put this into legal effect but lacks obligations for achieving their full operation.

7 **Building on their draft report *Transforming the resource management system: Opportunities for Change* (Resource Management Review Panel, above n 4), the Panel published multiple recommendations in another report, hoping to "design a system that delivers better outcomes for the environment, people and the economy": Resource Management Review Panel *New Directions for Resource Management in New Zealand* (June 2020) at 13. The three new Acts to replace and supplement the RMA will be the: Natural and Built Environments Act (providing for land use and environmental regulation); Strategic Planning Act (integrating legislation relevant to development and requiring long-term regional spatial strategies); and Climate Change Adaptation Act (addressing complex issues relating to managed retreat, funding and financing adaptations). Ministry for the Environment "Overview of the resource management reforms" (June 2021) <https://environment.govt.nz>. Reform will take several years and now includes reconsideration of local government structures. The Parliamentary Commissioner for the Environment has questioned the need to replace (rather than rewrite some elements of) the RMA. See Simon Upton, Parliamentary Commissioner for the Environment "RMA Reform: coming full circle" (RMLA Salmon Lecture 2020, The Northern Club, Auckland, 12 October 2020).**

8 The term *reactive* refers to research that patiently waits for legislators to enact laws and introduce policy instruments, and for courts to produce precedents. By definition, reactive environmental legal research either will not deal with problems not addressed by the legislature or the judiciary, or limits itself to issues

problem.[9] A problem is a *core* problem when it fully controls or defines the ultimate research issues, theoretical frameworks and methods.[10]

When selecting the theoretical framework used by mainstream environmental law research, it seems that most programmes and projects are either legally dogmatic (or otherwise legally positivistic) or are studies of the approaches applied in different countries. In other words, reactive research. This does not give priority (or a "significant problem height") to sustainable development because such research is not problematised with respect to sustainability.[11] Those studies that seemingly relate to sustainability problems have nevertheless little or no value from theoretical points of view if they do not lead to some conclusion from which something more can be learned.

concerning current law. *Proactive* research, on the other hand, refers to research at the forefront, aimed at creating or developing solutions.

9 **This article argues that law which *achieves and maintains ecological sustainability* is necessary for sustainable development. This is defined as the core problem.**

10 Although this article might seem somewhat harsh, it does not overlook the possibility of, or the need for, research outside the core problem. Research problems can be directly connected or indirectly connected with the core problem. For example, a research problem could be about a study of economic instruments for air pollution control to attain air quality standards without unnecessarily hampering development. If such studies are designed to increase the understanding of a basic issue *as part of the core problem* of achieving and maintaining ecological sustainability, there is an indirect but essential connection with the core problem. If the applied theory framework and methods are suitable to approach the core problem, the project is part of a core problem related research. If, however, the researcher applies theory which does not chime with the core problem, as when the instruments are only described and analysed, then it serves poorly because it is an indirect study around the core problem.

11 The concept of "significant problem height" (or priority) is intended to reflect the degree of advancement of problem-solving that might come out of a project as compared to previous research. **This concept goes back to a draft paper in Swedish, which is part of the background studies for the book: Staffan Westerlund *Fundamentals of Environmental Law Methodology* (Version 0.7b, Uppsala University Publications, Uppsala, 2007). The manuscript for this book was not published before Westerlund's death in 2012. Inga Carlman and Gabriel Michanek published the manuscript as a pdf in 2016: <https://www.diva-portal.org/smash/get/diva2:903401/FULLTEXT01.pdf.>** Its objective is to suggest criteria for finding projects which to the greatest possible extent are valuable as environmental science. Three theses were stipulated as follows (translated from the Swedish text): (1) The problem height is higher if the research problem is greater than previously solved research problems, and more theory and method should be developed to find a solution. (2) The problem height is judged in relation to a defined scientific discipline's levels of knowledge and method. (3) The relevant problem height is judged with respect to a defined discipline or mega-discipline.

This means something new with respect to the core problem of achieving and maintaining ecological sustainability must be learned.

The theoretical framework for environmental law easily becomes a crucial obstacle as regards the purposeful treatment of environmental issues, unless thoroughly considered and adjusted. If a problem is environment-related (for example, biodiversity)[12] but the theoretical framework is not fully compatible with relevant natural science,[13] the framework is insufficient, not to say irrelevant. Any legal theory framework intended to be applied in a research project relating to sustainable development must be adapted to the concept of ecological sustainability. If the theoretical framework does not pass a compatibility test, it must be adapted, or else abandoned in this context.[14] If not, poor science and law will result.

12 Environment-related is key terminology for environmental law. Environment-related law is law that says something about the environment, such as its quality and limitations. Since nature reacts according to the laws of nature, any law that relates to it is reactor-related. Action-related law says something about conduct, and activity-related law says something about activities. Both are actor-related. Environmental quality standards are typical examples of environment-related rules while standards of performance are examples of action-related or activity-related rules. The concepts of actor-related and reactor-related law is fundamental in environmental law methodology.

13 This is based on a simple thesis: any social or human science (or any science) that explicitly or implicitly presupposes something natural to be scientifically wrong, is not only incompatible with natural science but is also fundamentally wrong. **As will be seen in part 4 of this article, natural science (including Earth system science) has developed significantly in the last decade to provide a more realistic, holistic and complex understanding of human impacts on interdependent global systems. Contemporary environmental law theorists argue that environmental law (or ecological law) must also retain and develop norms of social and ecological justice, in addition to being correctly embedded within natural science. See, for example, "'Oslo Manifesto' for Ecological Law and Governance: adopted at the IUCN WCEL Ethics Specialist Group Workshop, IUCN Academy of Environmental Law Colloquium, University of Oslo" (21 June 2016) Ecological Law and Governance Association <https://elgaworld.org>.**

14 Scientific compatibility is another key concept in this article. Compatibility refers to one discipline producing theory and/or information that another discipline can import and use for its own benefit. A compatibility test for sustainability must include full harmony between the theoretical frameworks and simple natural scientific facts, which relate to humanity's dependence on nature and the laws of thermodynamics.

2. THREE ENVIRONMENTAL LEGAL ERAS

This takes us to paradigms.[15] We can distinguish at least three eras relevant to environmental law:[16]

1. the pre-environmental era (pre-1960s);
2. the old environmental era (from the 1960s to about 1992); and
3. the new environmental era (from about 1992 to the present).

2.1 Background of Environmental Eras

During the pre-environmental era, the law mainly focused on balancing contemporary interests, neighbour law, nuisance, spatial planning and resource exploitation.[17] This era ended with the environmental debate that accelerated during the 1960s and eventually resulted in various legislations and events such as Sweden's Environmental Protection Act 1969,[18] the United States' National Environmental Policy Act 1969,[19] and the 1972 Declaration of the

15 In Staffan Westerlund "Världsbilder, rättsvetenskap, juridik och hållbar utveckling" [2006] Svensk Juristtidning 309 (translation: "Worldviews, jurisprudence, law and sustainable development"), paradigms of Swedish environmental law, and the work of lawyers and scholars, were compared with the paradigm of sustainable development. It concluded that much depended on the worldviews or values of judges and scholars, and on their perceptions of science. One must also remember that Swedish legal training was — and is — mostly pre-environmental. The blame for which ultimately goes back to legal academia where mostly reactive research and studies prevail under older paradigms. **For reflections on how all legal education should change to overcome these and other problems see Sanford E Gaines "Reimagining Environmental Law for the 21st Century" (2014) 44 Env't L Rep 10,188 at 10,211–10,213.**

16 These concepts of old and new environmental law are inspired by Michael Decleris *The law of sustainable development: General principles* (European Commission, July 2000).

17 Pre-environmental law like economics was most probably constructed and understood as if there were no limits to economic growth and that all natural resources were substitutable. **In other words, during the pre-environmental era, people understood economic growth as not constrained by finite natural systems. The highly influential report *The Limits to Growth* was not published until 1972. Donella H Meadows and others *The Limits to Growth: A Report for The Club of Rome's Project on the Predicament of Mankind* (2nd ed, Universe Books, New York, 1974). A more recent version has been published in 2004: Donella Meadows, Jorgen Randers and Dennis Meadows *Limits to Growth: The 30-Year Update* (Chelsea Green Publishing Company, Vermont (United States), 2004).**

18 **The Annotator was unable to find an online source to this legislation.**

19 **The National Environmental Policy Act 1969 was the United States' very first major environmental law. Section 2 states its purposes are "[t]o declare**

United Nations Conference on the Human Environment (commonly known as the Stockholm Declaration).[20]

Environmental law emerged late in the 1960s. It was often based on precaution — following the best available technology (at reasonable cost) and balancing contemporary interests with public health and nature conservation, which was often regarded as a public interest within public law.[21] International environmental law grew considerably but without integrating ecological thinking.[22] Environmental legal principles evolved or were constructed.

While this old environmental law was mainly oriented towards contemporary issues, the 1980s brought future generations into the debate and policy considerations because of the *World Charter for Nature*,[23] and *Report*

a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality".

20 **The Declaration of the United Nations Conference on the Human Environment (or Stockholm Declaration) was a key outcome: *Report of the United Nations Conference on the Human Environment* UN Doc A/CONF.48/14/Rev.1 (5–16 June 1972) at 3.**

21 There was also a competing approach based on environmental limits leading to pollution control or quality standards, which was seemingly based on ideas that protective measures were not called for as long as a level of the environmental quality was acceptable. For example, this was rather broadly expressed in Soviet Union laws. The basic flaw of the Soviet system was its poor legal operationalisation. There was no effective feedback between the actual environmental result and restrictions on industry. Another flaw, viewed from modern sustainable development aspects, is that such an approach leads to an unnecessary blocking of environmental resources.

22 **Staffan Westerlund "Wetlands and the law" (presented to Conferêcia Internacional De Direitio Ambiental (translation: International Conference on Environmental Law), Rio de Janeiro, 28–31 October 1991).** For example, the principle of harmless use of territory (*sic utere*) was restrictively understood to apply to air emissions (and other transboundary pollutants) but not to ecological interdependence across national boundaries. **This is referred to as the "do no harm" principle, see Stockholm Declaration, Principle 21: *Report of the United Nations Conference on the Human Environment*, above n 20, at 5.** It did not account, for example, for the environmental consequences of habitat degradation which manifest outside the country where the habitat degradation occurred: Staffan Westerlund 1991. Natural science tells us that a habitat in one area is a subsystem in the larger ecosystem that is the **[global or planetary]** biosphere. **See part 4 of this article.**

23 **The *World Charter for Nature* UN Doc A/RES/37/7 (28 October 1982) at 17** "[reaffirms] that man must acquire the knowledge to maintain and enhance his ability to use natural resources in a manner which ensures the preservation of the species and ecosystems for the benefit of present and future generations".

of the World Commission on Environment and Development (more commonly known as *Our Common Future* or the Brundtland Report).[24] These led to the United Nations Conference on Environment and Development held in Rio,[25] and the emergence of a new core problem for environmental and other law, namely "sustainable development". Hence, the beginning of the new environmental era.

Why should we refer to "sustainable development" in environmental law? Does the concept of sustainable development extend beyond just environmental issues to include economic and social issues? The simple answer is "yes", but a full answer comes from the inevitable fact that sustainable development cannot take place without ecological sustainability, which is related to environmental quality, natural resources and systems. Therefore, environmental law relates to the necessary fundament or prerequisite for sustainable development. From this, it follows that the core object of environmental law for sustainable development is the critical factor of ecological sustainability.[26]

2.2 Environmental Issues Under Each Era

Environmental legal issues could be approached under pre-environmental law paradigms. However, this was done without genuine environmental problematisation. Much allegedly, environmental legal research still fits in here — even today. Environmental legal research approaches environmental law as if it were a species of traditional law (such as procedural, public, private, criminal and international law).

Under the old environmental paradigm, environmental issues were approached as special in themselves and contemporary environmental consequences can be observed. However, they were not always combined with

24 ***Report of the World Commission on Environment and Development*** **UN Doc A/42/427 (4 August 1987). Also known as the Brundtland Report.**

25 **The United Nations Conference on Environment and Development (also known as the Earth Summit) resulted in key outcomes such as the Rio Declaration and other multilateral environmental treaties for climate change and biodiversity.** ***Report of the United Nations Conference on Environment and Development: Volume I — Resolutions Adopted by the Conference*** **UN Doc A/CONF.151/26/Rev.1(Vol.I) (3–14 June 1992). Annexed to this report is the Rio Declaration, Agenda 21 and Rio Forest Principles. For other outcomes see "United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3–14 June 1992" United Nations <www.un.org>.**

26 **For a discussion of the differences between "weak" and "strong" sustainable development see Klaus Bosselmann "The Concept of Sustainable Development" in Klaus Bosselmann, David Grinlinton and Prue Taylor (eds)** ***Environmental Law for a Sustainable Society*** **(2nd ed, New Zealand Centre for Environmental Law, Auckland, 2013) 95 at 100–104. Weak sustainable development does not conceive of social and economic activity as being dependent upon (or nested within) ecological systems.**

environmental problem-solving. It was often limited to reactive research. Some exceptions were the search for solutions to contemporary environmental quality problems; for example, surrounding or ambient air and water quality. Such is the mainstream of old environmental law.

The new environmental paradigm recognises sustainable development as a legal issue, and its achievement and maintenance as a legal scientific core problem. Consequently, it recognises ecological sustainability as a necessary precondition, and therefore, compatibility with natural science as a self-evident academic quality. In international law, this includes intergenerational equity and consequently the extension of human rights to all future generations.[27] This new environmental paradigm understands Earth and its atmosphere as a gigantic but limited biosphere, the carrying capacity of which limits what humanity can do with respect to total anthropogenic impact on the whole biosphere over time. Such is the core of new environmental law.[28]

3. RESEARCH ASPECTS

3.1 Against or Towards

The following discussion is especially addressed to professors, students and others who may directly or indirectly influence how legal research is directed and carried out.

Any opposition to research ideas based on the new environmental paradigm and intended to be implemented by new environmental law, is *against* the theory for sustainable development. For example, if the opponents cling to pre-environmental or old environmental paradigms, claiming that these and not the new paradigm should rule legal research for sustainable development, then this works against (or is contrary to) the theory for sustainable development.

27 ***Report of the World Commission on Environment and Development*, above n 24.**

28 **This understanding of interconnected and interdependent planetary systems, which operate as a whole complex "Earth System" and creates fundamental constraints on human activity, is now more clearly conceptualised by Earth system science and the planetary boundaries framework. See part 4 of this article. See also, for the inception of the concept of future generational equity: Edith Brown Weiss "In Fairness To Future Generations and Sustainable Development" (1992) 8 Am U Int'l L Rev 19; *Report of the World Commission on Environment and Development*, above n 24; and the Rio Declaration annexed to the *Report of the United Nations Conference on Environment and Development*, above n 25.**

On the other hand, promoting legal research based on the new environmental paradigm promotes theory for sustainable development.

Why then say "towards" and not "for" ecological sustainability? The simple answer is: we are not there yet. We can see some basics, yes. But we do not yet fully know the scope and content of the law. Defining the scope and content of the law is where we find the most pressing challenge for legal scholars and legislators. The situation is extremely urgent, because unless law is made sustainable, it protects unsustainable conduct. Under the rule of law, if something is not outlawed, you cannot legally prohibit or restrict it without first changing the law.

What then is the result of unsustainable law? The answer — ongoing ecological degradation — is obvious to anyone who understands the following: (a) the rule of law; (b) the fact that ecological resources and systems are limited; and (c) the Tragedy of the Commons.[29] As an alternative, we could employ Mahatma Gandhi's famous statement: "the world has enough for everybody's need, but not for everybody's greed".[30]

3.2 Pre-environmental Legal Research

One conclusion at this stage is that purely reactive research *in itself* does not solve problems.[31] This is because reactive research under pre-environmental paradigms is unlikely to pose questions and produce data and information in a format that is useful for sustainability research.

29 **Note: (a) refers to an element of the "rule of law", which in many legal systems is understood to provide that non-illegal activity is, by definition, legal. This puts considerable onus on the law to constantly develop to regulate human activity and respond to new problems; (b) refers to the finite nature of ecological systems; and (c) Tragedy of the Commons comes from Garrett Hardin's theory that humans (in the absence of a rational incentive) will always selfishly use as much of a common resource as possible, leading to its overuse, ruin or degradation. From this, many have argued that the only responses are to (a) grant private property rights or (b) implement government management. Garrett Hardin "The Tragedy of the Commons" (1968) 162 Science 1243. Scholars point out that Hardin's theory relates to unmanaged common pool resources that are vulnerable to a first come, first served and free-for-all — and not to a "commons". This is because in commons scholarship a "commons" is subject to mostly successful social practices and rules that ensure fair and ongoing access to environmental resources. See David Bollier and Silke Helfrich *Free, Fair and Alive: The Insurgent Power of the Commons* (New Society Publishers, British Columbia, 2019).**

30 This statement now looks rather optimistic but at the time of making, the global population was less than half of what it is at present.

31 This is inherent in reactivity.

If, however, such pre-environmental research carefully analyses the environmental consequences or contribution of law to those consequences, and provided further that this analysis aims to understand how the law affects ecological and natural resources, it might be of some value at least as a basis for research on sustainable development. But since reactive research does not in itself solve problems, we can presume that it yields very little at a high cost, and also that it might keep the researcher too far behind the research frontiers.

3.3 Old Environmental Legal Research

Reactive research under an old environmental paradigm, on the other hand, at best recognises the relevance of nature's reactions, of ecology, and consequently of nature's non-linear responses to human interference.[32] It can include analyses of contemporary effects and consequences. Reactive research without environmental consequence analysis is, however, not much better than reactive research under pre-environmental paradigms.

Proactive research under the old environmental paradigm calls for compatibility with natural science. Otherwise, the solutions will lack scientific foundation. It must assimilate environmental consequence analyses of previous, present and considered law, and how problems have been managed. It then proceeds to solve the environmental problems which are recognisable under the ruling paradigm.

32 One major barrier to the development of pre-environmental thinking into new environmental thinking is the complexity of interrelationships between human conduct and conditions in nature, due to nature's tendency to react in a non-linear manner to anthropogenic interference. This was a core problem even under the old environmental law provided that environmental quality standards or other limit rules relating to human conduct (including business) were to be legally effective. Achieving effectiveness calls for legal operationalisation — that is, an unbroken chain from a quality standard all the way to rules that are directly enforceable against persons. Such operationalisation serves as a rectifying process — meaning a process where the non-linearity of such ecosystems, the quality of which was the object of quality standards, is rectified into directly enforceable rules. Lena Gipperth **"Miljökvalitetsnormer. En rättsvetenskaplig studie i regelteknik för operationalisering av miljömål" (PhD Thesis, Uppsala University, 1999) (translation: "Environmental quality standards. A forensic study in control technology for operationalisation of environmental goals").** This is summarised in English in Staffan Westerlund "Law and Mankind's Ecological Dilemma" **in Martin Führ, Rainer Wahl and Peter von Wilmowsky (eds)** ***Umweltrecht und Umweltwissenschaft: Festschrift für Eckard Rehbinder*** **(Erich Schmidt Verlag, Berlin, 2007) 287 at 293 (translation:** ***Environmental Law and Environmental Science: Festschrift for Eckard Rehbinder*****).**

3.4 New Environmental Legal Research

We arrive now at research *for* sustainable development. New environmental legal research can also be divided into reactive and proactive research — although only the latter qualifies for the preposition "for".

Reactive research under the new environmental paradigm includes — besides what applies to similar research under the old environmental paradigm — an understanding of the biosphere function and intergenerational equity. This requires more complex consequence analysis.

On the other hand, with proactive research under the new environmental paradigm, the problematisation of humanity, law, the biosphere and sustainability surfaces. This is where environmental law has made little significant progress. There are, however, strong reasons to assume that the introduction of systems theory and thinking,[33] in combination with legal operationalisation and avoidance of implementation deficits, along with the inter-compatibility of legal and natural science (recognising *inter alia* the significance of non-linearity), will open a very promising path (and not a dead end) towards a theory for sustainable development.

This lack of progress is serious in many respects. For example, sustainable development has been part of soft international law for at least 25–30 years and part of some countries' national law for about the same time.[34] It was formulated more than 35 years ago and provided the foundation for the Brundtland Report.[35]

33 Decleris, above n 16. **Systems thinking and systems analysis maintains that many aspects of the world operate as complex interrelated systems, rather than simple cause-and-effect relationships. Understanding how systems work is fundamental to understanding both complex problems and how to intervene to develop potential solutions. See Donella H Meadows *Thinking in Systems: A Primer* (Earthscan, London, 2008).**

34 **Soft international law is a term referring to norms, principles and agreements of a legal quality but which states do not accept as being legally binding. Since the time of writing (2008), the legal quality of sustainable development has changed significantly. It is now (arguably) a legally binding norm of international environmental law. See, for example, Klaus Bosselmann *The Principle of Sustainability: Transforming Law and Governance* (2nd ed, Routledge, New York, 2017).**

35 ***Report of the World Commission on Environment and Development*, above n 24.**

The global population has so far increased from less than four billion in 1972 to nearly eight billion in 2021.[36] Global biodiversity has deteriorated considerably during the same period.[37] Virtually all relevant natural resource trends show decline over the past 35 years, as the content of anthropogenic environmentally problematic substances in the biosphere has increased.[38] No country, nor the international legal order, has yet gained full and exercisable control of sustainability.[39]

The two illustrations below are sufficient justification. They depict changes in the world which either increase the burden on the biosphere (population increase) or constitute virtually irreversible ecological degradation (biodiversity loss).

36 **"World Population by Year" Worldometer <www.worldometers.info>. As of August 2021 the world population is estimated to be around 7.9 billion people. "Current World Population" Worldometer <www.worldometers.info>.**

37 **The Global Living Planet Index shows that between 1970 and 2016 there has been on average a 68 per cent decrease in population sizes of fish, reptiles, amphibians, birds, and mammals. World Wildlife Fund *Living Planet Report 2020: Bending the Curve of Biodiversity Loss* (September 2020) at 10.**

38 **The overall trend of degradation continues. See Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services *IPBES: The global assessment report on Biodiversity and Ecosystem Services* (2019). According to the lastest scientific report on climate change, global atmospheric surface temperatures are 1.1°C warmer than pre-industrial times. Both the scale of changes across the climate system and the present state of many aspects of that system are unprecedented and due to human interference. Intergovernmental Panel on Climate Change *AR6 Climate Change 2021: The Physical Science Basis* (August 2021). Three other *AR6* reports are yet to be published in 2022: see Intergovernmental Panel on Climate Change "Reports" <www.ipcc.ch>.**

39 **See United Nations Environment Programme *Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies* (DEW/2335/NA, February 2021). This report outlines why the world is at risk of failing to meet its most recent and comprehensive sustainable development targets known as the United Nations Sustainable Development Goals [UN SDGs]. The complete list of UN SDGs can be found at "The 17 Goals" United Nations Department of Economic and Social Affairs <https://sdgs.un.org/goals>.**

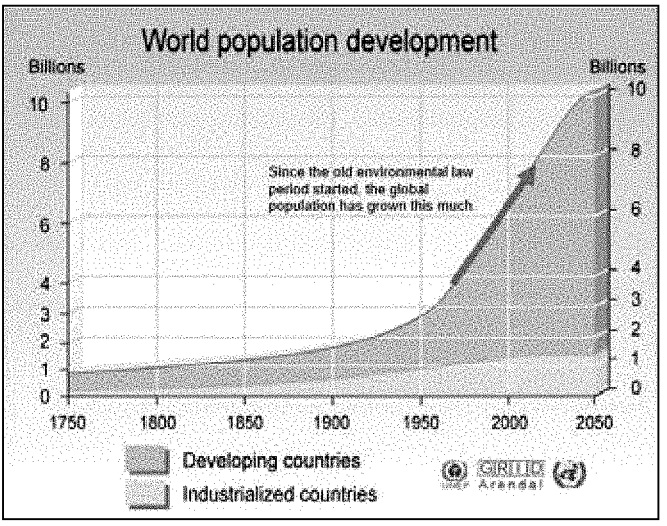

Figure 1: World Population Development.[40]

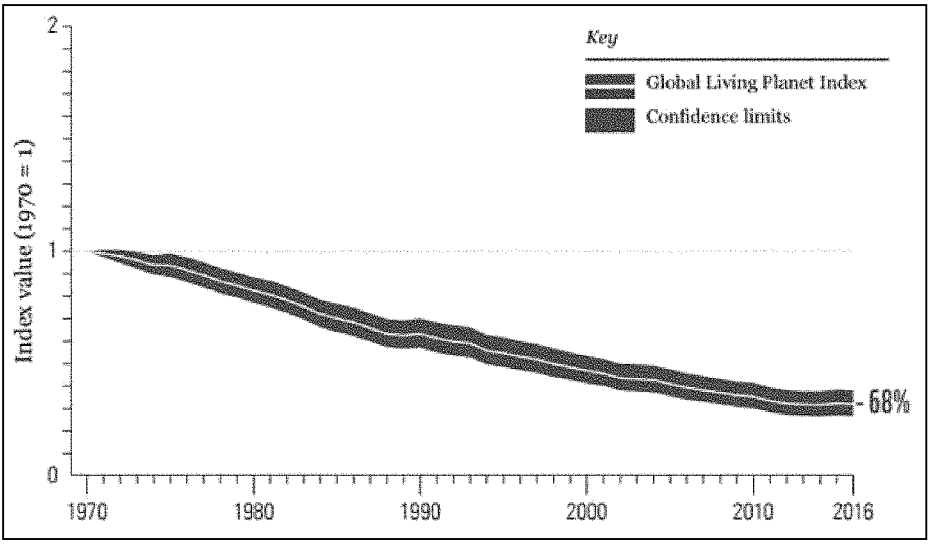

Figure 2: The Global Living Planet Index (LPI) 1970 to 2016.[41]

40 **Philippe Rekacewicz, United Nations Environment Programme and GRID Arendal "World population development" GRID Arendal <www.grida.no>. The comment and arrow in the graph were added by Westerlund.**

41 **World Wildlife Fund, above n 37, at 16. On the graph "[t]he white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend". Westerlund used a similar WWF graph from The Living Planet Index, 1970–2000.**

The LPI is an indicator of the state of the world's biodiversity: it measures trends in populations of vertebrate species living in terrestrial, freshwater and marine ecosystems.[42] The LPI tracks the abundance of 20,811 populations of 4,392 species and using that data, this graph shows the monitored vertebrate species population have on average decreased by 68 per cent between 1970 to 2016.[43]

Since 1970, biodiversity (here illustrated by vertebrates) has decreased and the trend seems to continue. This has taken place during the old environmental era and the beginning of the new one.[44]

During roughly the same period covered by the two illustrations, environmental law not only emerged as a discipline but gained acceptance and began to be broadly taught at universities. But which environmental law is that? Generally, the answer seems to be "environmental law as is" or reactive research.

If so, as no country has established a sufficient comprehensive legal order for sustainability,[45] environmental law training that merely deals with "environmental law as is", is inherently reactive and gives no *real* insight into theory for environmental law for sustainable development.

One remedy is to expand environmental law training to cover not only reactive research, but also "environmental law methodology".[46] This term is

42 **At 17.**

43 **At 16.**

44 **There is considerable discussion on whether the planet is now experiencing a human-induced sixth mass species extinction event. Anthony D Barnosky and others "Has the Earth's sixth mass extinction already arrived?" (2011) 471 Nature 51.**

45 A legal order can also be regarded as a legal *system*. A sustainable legal order facilitates — as a system and as a whole — efforts to achieve and consolidate sustainability. If a legal order includes counterproductive **or anti-ecological sustainability law (often outside the specific environmental laws; for example, company law, trade law, tax law)** to the effect that sustainability cannot, or will not, be achieved, then there is no sustainable law. **Staffan Westerlund *En hållbar rättsordning: rättsvetenskapliga paradigm och tankevändor* (Iustus förlag, Gothenburg, 1997) (translation: *A sustainable legal order: forensic paradigm and thought processes*). The basic point made here is that ecological sustainability cannot remain siloed to "environmental law". Because ecological sustainability is a basic precondition to human existence, it must permeate entire legal systems and directly address those parts of legal systems that drive conflicting behaviours and consequences. The effort to transform all law is a central characteristic of "ecological law and governance": see Klaus Bosselmann "The Framework of Ecological Law" in Bharat H Desai (ed) *Our Earth Matters: Pathways to a Better Common Environmental Future* (IOS Press, Amsterdam, 2021) 33.**

46 **This environmental law methodology is briefly characterised in Westerlund, above n 11, at 7:** "Environmental law methodology takes its point of departure

chosen carefully to reflect the proactive stance of this discipline. It does not react to law that is already enacted but deals with techniques for environmental legal control and consequently with solutions to environmental control problems. Problem-solving is the main objective and the approach is inherently proactive.

When we put this in the context of sustainable development — while recalling that so far no country has created a legal order that is sufficient for sustainability — it is easy to see this as a step towards improving environmental legal science; a direction *towards* theory for sustainable development.

3.5 Intermediate Conclusion: Against or Towards

The basic message against the background of the three environmental eras is that if we stick to pre-environmental or old environmental paradigms and theoretical frameworks, we are acting against theory for sustainable development. The previous paradigms are not capable of easily (if at all) adapting intergenerational equity into legal thinking and combining it with ecological understanding, where non-linearity is an ever-present issue and the biosphere's limited carrying capacity is another. When we deal with law as is — that is, reacting to already enacted and practised law — this effectively slows down (not to say obstructs completely) significant progress towards adequate legal theory for sustainable development.

4. THEORY NEEDS

This part discusses the issue of a theory *for* sustainable development that is relevant for legal science and law.[47] Some hints have already been given above.

in how to achieve and maintain ecological sustainability. Its overall *object* is environmental control. Such control aims at environmental management where natural resources are not only included, but regarded as the real fundament."

47 I deliberately chose the expression "theory *for*" to stress proactivity. Much is already written about theory *on* sustainable development, from analyses of what was intended **by the outcomes of the United Nations Conference on Environment and Development, above n 25** — that is, its legal significance, to sceptical essays which rather reflect an author's state of denial more than anything else. Much that is written seems to reflect efforts to reshape the notion of sustainable development so that it fits into older, pre-environmental disciplinary paradigms. Whenever an author misses the significance of ecological sustainability to the ability of all future generations to meet their needs, the academic result runs the risk of being poor. **See earlier comment on "weak" versus "strong" sustainability: Bosselmann and others, above n 26. See also the new discussion on "donut economics", which attempts to transform economic systems so**

It is rather easy to point to present inadequacies and what it might signify. Reasonable explanations for inadequacies include burdens inherited from older, now irrelevant paradigms. The rather critical approach, which follows largely from the significant distinction between reactive and proactive research, should not be understood as following from any performed meta-scientific quantitative assessment. Nor should it be taken as a suggestion that nobody cares for sustainable development. Research and development of theory *on* or *for* sustainable development has started, that is for sure.

Some of this research might, however, have missed the core problems. Other efforts might rather be due to denial than real problem-solving while some might have led to dead ends.[48] Some research is probably hampered by traditional views of legal science, normally leading to the dominance of reactivity. At its worst, slow theory development and reactivity on behalf of legal scholars leaves achieving and maintaining ecological sustainability to other disciplines. This is risky, unless it is followed by the essential, fully understood and recognised information about the role of law in democratic nations under the rule of law.[49]

they grow beneficial ecological and social justice outcomes: Kate Raworth *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist* (Random House Business Books, London, 2017).

48 My first effort with sustainable development as the core problem led into a dead end. **In Staffan Westerlund *Miljöskyddslagstiftning och välfärden* (Natur och kultur, Stockholm, 1971) (translation: *Environmental protection legislation and welfare*),** the idea was that cost-benefit analysis could be developed further as a legal method for the balancing of interests within the framework of sustainable development. It took me several years and some clever observations from my supervisor to realise that this would simply not fly, mainly because uncontrollable obstacles emerged when it came to assessing the present value of non-monetary (ecological) resources for future generations. **This failure, or illumination, is further elaborated in his book published in 1997: Westerlund, above n 45. In *Miljöskyddslagstiftning och välfärden*, above,** sustainable development was defined to mean: "to economise natural resources and to keep the environment at such a high quality so that in the long term, we do not have to face a lower standard increase, or anyway a standard decrease, which is caused by how we have degraded natural resources without this degradation having given at least the equivalent on the positive side, as concerns the long-term welfare" (translated from Swedish). This was a very optimistic view of sustainable development, aiming at long-term human welfare instead of needs. **It led into a dead end because Westerlund was (by his own admission) hooked on welfare economics which he tried to integrate with law on sustainability. He concludes: it would not be a good idea to make *that* mistake again.**

49 This issue is addressed in the three-filter theory and theory of environmental implementation deficits, **presented in Westerlund, above n 45; Staffan Westerlund *Miljörättsliga grundfrågor 2.0* (2nd ed, Åmyra förlag, Uppsala, 2004) (translation: *Basic environmental issues* 2.0); and to be further presented in Westerlund, above n 11.**

It is at this juncture that legal scholars have a considerable responsibility aside from securing information dissemination. Since law has special and comprehensive functions such as creation of effective policy instruments, legal scholars must participate in research and help develop such instruments. They must also understand and apply theory and techniques compatible with the natural sciences. And not only that, they must also understand and apply systems theory and analysis. Otherwise, there is a risk of their contributions to control systems being inherently insufficient for sustainability. If so, in combination with the effects of the rule of law, this would most probably result in an unsustainable legal order, which in turn would secure ecological *un*sustainability and finally no sustainable development.[50]

When facing other social and human sciences, science for sustainable development might have to oppose, for example, political science strategies emphasising decentralisation for decentralisation's and democracy's sake. Considering the Tragedy of the Commons and Ashby's Law,[51] it only takes

50 **Given the importance of the "rule of law", scholars have begun debating the emergence of "the environmental rule of law [which] is understood as the legal framework of procedural and substantive rights and obligations that incorporates the principles of ecologically sustainable development in the rule of law. Strengthening the environmental rule of law is the key to the protection, conservation, and restoration of environmental integrity. Without it, environmental governance and the enforcement of rights and obligations may be arbitrary, subjective, and unpredictable." International Union for Conservation of Nature *World Declaration on the Environmental Rule of Law* (2016) at 2. See also Christina Voigt (ed) *Rule of Law for Nature: New Dimensions and Ideas in Environmental Law* (Cambridge University Press, Cambridge, 2013). For related developments in constitutional law see Louis J Kotzé *Global Environmental Constitutionalism in the Anthropocene* (Hart Publishing, Portland, 2016). On the development of ecological sustainability as a *grundnorm* see Klaus Bosselmann "The Imperative of Ecological Integrity: Conceptualising a Fundamental Legal Norm for a New 'World System' in the Anthropocene" in Louis J Kotzé (ed) *Environmental Law and Governance for the Anthropocene* (Hart Publishing, Portland, 2017) 241 at 241–265. In relation to property rights see David Grinlinton and Prue Taylor (eds) *Property Rights and Sustainability: The Evolution of Property Rights to Meet Ecological Challenges* (Martinus Nijhoff Publishers, Boston, 2011). For an overview of developments in environmental rights, including human rights and rights of nature, see David R Boyd *The Environmental Rights Revolution: A Global Study of Constitutions, Human Rights, and the Environment* (UBC Press, Vancouver, 2012); and David R Boyd *The Rights of Nature: A Legal Revolution That Could Save the World* (ECW Press, Montreal, 2018).**

51 **William Ross Ashby *An Introduction to Cybernetics* (Wiley, New York, 1956). "In colloquial terms Ashby's Law has come to be understood as a simple proposition: if a system is to be able to deal successfully with the diversity of challenges that its environment produces, then it needs to have a repertoire of responses which is (at least) as nuanced as the problems thrown up by**

common sense to conclude that such a strategy as an overriding goal or strategies proposed based on voluntariness seem fruitless.[52] Defence of that strategy calls for methods to handle not only the Tragedy of the Commons and what follows from normal economics, but also future problems including:

- When the nice guys have voluntarily restricted their environmental impact, but the less nice or even bad guys have not restricted theirs (then the nice guys may have incurred a detriment and the bad guys a benefit); and
- When a resource is so limited that quotas must be distributed and that quota is based on previous consumption (or environmental impact), then the nice guys end up with less quota than the not so nice guys (again the nice guys may incur a detriment and the bad guys a benefit).

Whatever is not illegal is protected by the law and the easily defended theory that whichever policy instrument is effective in one way or another must be directly or indirectly upheld by the legal order. That is the rule of law. Some of these aspects are discussed later. Without good legal scholarship, such strategies are destined to exacerbate *un*sustainability.

In this article, I used the expression "towards" theory for sustainable development. I also hinted previously that we are not there yet. But we do know something already. We know, for example, that such theory must deal (not to say cope) with complex problems and issues which are not understandable without natural science. Good science requires theory to be sought and developed, starting from the chosen scientific problem, not the other way around. Here the chosen problem, the core legal question, as regards sustainable development is: how should law for sustainable development be?

This question takes us to the necessity of ecological sustainability for sustainable development. Achieving and maintaining ecological sustainability constitutes the core problem of new environmental law.[53] It indicates some

the environment. So a viable system is one that can handle the variability of its environment. Or, as Ashby put it, only variety can absorb variety." John Naughton "2017: What Scientific Term or Concept Ought to be More Widely Known?: Ashby's Law of Requisite Variety" Edge <www.edge.org>.

52 **The concepts of self-regulation and voluntary environmental compliance remain contentious in environmental governance and law. See generally Westerlund, above n 11.**

53 **The concept of "ecological integrity" is increasingly used in domestic and international environmental law to encapsulate a suite of indicators or measures of ecological intactness. See Rakhyun E Kim and Klaus Bosselmann "International Environmental Law in the Anthropocene: Towards a Purposive System of Multilateral Environmental Agreements" (2013) 2 Transnational Environmental Law 285; and Peter Bridgewater, Rakhyun E Kim and Klaus Bosselmann "Ecological Integrity: A Relevant Concept for**

theory needs. Full compatibility with relevant natural science is necessary. Ecological limits, thermodynamics and, consequently, the carrying capacity of the biosphere are essential issues.[54] Unlimited anthropogenic impact does not go together with ecological sustainability. Thermodynamics, on the other hand, sets an exergy price (or energy cost) on the restoration of such environmental qualities and other natural resources which do not heal by nature and solar energy.[55] Serious ecological degradation is virtually beyond repair because

International Environmental Law in the Anthropocene?" (2015) 25 Yearbook of International Environmental Law 61.

54 **The notion of the carrying capacity of the biosphere has evolved in recent years with the development of Earth system science. This science understands the Earth to be a whole complex system comprising four key interdependent spheres: atmosphere, hydrosphere, geosphere and biosphere. Humanity is now disrupting the ability of these spheres to create and maintain the living conditions necessary for life, as it is currently known. This human-caused disruption is dangerous, sudden and potentially irreversible. The planetary boundary framework emerged in 2009 (updated in 2015) as a means to translate Earth system science into a boundary-setting tool for limiting negative human impacts on the Earth system. It uses a set of nine specific yet interrelated planetary boundaries, for key Earth system processes. If crossed — as is currently the case for four boundaries (including climate change and biosphere integrity) — the chance of maintaining the whole Earth system in a state that supports life and human well-being diminishes as dangerous levels and tipping points are reached. See Will Steffen and others "Planetary boundaries: Guiding human development on a changing planet" (2015) 347 Science 736. Earth system science and the planetary boundaries framework raise complex and critical questions for governance and law. For example, the emerging field of Earth system law is concerned with how the current limitations of environmental law can be overcome to ensure humanity respects the planetary boundaries. See Louis J Kotzé and Rakhyun E Kim "Earth system law: The juridical dimensions of earth system governance" (2019) 1 Earth System Governance (100003) and Rakhyun E Kim and Louis J Kotzé "Planetary boundaries at the intersection of Earth system law, science and governance: A state-of-the-art review" (2020) 30 Review of European, Comparative & International Environmental Law 3; and Paulo Magalhães and others (eds) *The Safe Operating Space Treaty: A New Approach to Managing Our Use of the Earth System* (Cambridge Scholars Publishing, Newcastle upon Tyne, 2016). For a critique of conventional international environmental law, from the perspective of Earth system science, see Duncan French and Louis J Kotzé "'Towards a Global Pact for the Environment': International environmental law's factual, technical and (unmentionable) normative gaps" (2019) 28 RECIEL 25.**

55 **Staffan Westerlund "Miljön och avvägningarna" in Gabriel Michanek and Ulla Björkman (eds) *Miljörätten i förändring: en antologi* (Iustus förlag, Uppsala, 2003) (translation: "The environment and the trade-offs" in *Environmental law in change: an anthology*).**

of exergy limitations.[56] This reduces considerably, not to say fatally, the possibilities of societies to adhere to the philosophy of "degrade now, upgrade [repair or restore] later".[57] This is a natural science based aspect relevant to law for ecological sustainability.

In environmental law research, so-called policy instruments — another term could be "means of control" or "control instruments" — receive much more attention than science. Law is often placed alongside other policy instruments, as if law and, for example, economic incentives, were alternatives to each other. Such approaches are often just sloppy, since law generally secures economic instruments and many soft instruments such as eco-labelling and other informative instruments. When so-called regulatory instruments are likened to economic instruments, the authors are probably only thinking of one part of the law, namely such rules which include, or are the foundation of, commands and prohibitions — direct action-regulating rules.

To avoid running into different dead ends when developing theory *for* sustainable development, the role and possible functions of law must be well recognised. It seems that legal scholars have an important educational task to fulfil, explaining the concept of rule of law and legality, and the consequent legal fact that whatever is not illegal is instead legal and in principle protected by the legal order. As most *un*sustainable conduct in the history of humanity has not been illegal, it has therefore been legal.[58] For fruitful compatibility to occur,

56 Compare this with eco-exergy according to SE Jørgensen *Eco-Exergy As Sustainability* (WIT Press, Southampton, 2006).

57 In environmental law research, exergy seems a fruitful factor. In the laws of thermodynamics, simply put, exergy is the useful quality of energy. **Jonas Christensen based his research on phosphorus, ecocycling and environmental law: Jonas Christensen *Rätt och kretslopp: Studier om förutsättningar för rättslig kontroll av naturresursflöden, tillämpade på fosfor* (Iustus förlag, Uppsala, 2000) (translation: *Law and cycle: Studies on conditions for legal control of natural resource flows, applied to phosphorus*).** See also, for example, the definition offered by Jørgensen, above n 56, at 48: "Exergy is defined as the amount of work (entropy-free energy) a system can perform when it is brought into thermodynamic equilibrium with its environment." There is also a related concept "emergy" which Jørgensen defines as "the ultimate cost to construct any component in an ecosystem expressed in solar equivalents". This has been applied in a discussion on balancing of interests (and proportionality) with exergy and not money as a common denominator in Westerlund, above n 55.

58 **See the previous references to anti-ecological sustainability law (above n 45); and advocacy for the "environmental rule of law" or the "rule of law for nature" (above n 50). Some scholars discuss the need for a new default position in environmental law: see Aðalheiður Jóhannsdóttir "The significance of default: A study in environmental law methodology with emphasis on ecological sustainability and international biodiversity law" (Doctor of Law, Dissertation, Uppsala University, 2009). Some scholars discuss a fundamental duty of care or responsibility and respect for the**

policy science, sociology of law and other social and human disciplines must understand and accept science for sustainable development. From this follows that virtually, any so-called policy instrument intended to function purposefully must have some kind of implicit or explicit legal sustenance.

Recognising law as a policy instrument — by means of which a multitude of other more or less special policy instruments can be regulated and controlled — and allowing for the rule of law, it is clear that the law must lay down and sustain limits to human activities that relate to the environment and natural resources. This must be done to the extent of sufficiently safeguarding the ecological and resource-related foundations of the biosphere, in theory and in fact.

Environment-related limit rules will usually call for legal operationalisation. Environmental law methodology has identified this kind of law as not so much goal oriented law as "navigation" law,[59] thus lending the term "navigation" a special legal meaning. It goes back to the peculiarities arising from sustainable development's failure to qualify as a positive "goal" in a normal sense,[60] but as something that is to continue endlessly (until the sun goes out). For legislators to manage this, the solution is to install legally based control systems to navigate society, and the global population, so that any course of development leading to *un*sustainability is safely avoided. Hence the navigation analogy.[61]

The achievement of sustainability calls for large societal systems to exercise adequate and sufficient control of persons' conduct, so that the natural system (the biosphere) will not be degraded. Environmental legal research must therefore be compatible with systems theory as well,[62] observing for example, Ashby's Law.[63]

environment: see Klaus Bosselmann *Earth Governance: Trusteeship of the Global Commons* (Edward Elgar, Cheltenham, 2015); and Klaus Bosselmann "Environmental trusteeship and state sovereignty: can they be reconciled?" (2020) 11 Transnational Legal Theory 47.

59 Gipperth, above n 32.

60 If sustainable development is achieved, the tricky task is to maintain it in principle for ever.

61 **UN SDGs have been framed as a series of goals or targets — the achievement of which will lead towards and maintain sustainable development by 2030. Note, however, the observation that the world is currently failing to meet most of the nature-based goals which will (in turn) undermine the UN SDGs: see Convention on Biological Diversity "Global Biodiversity Outlook 5" <www.cbd.int/gbo5>.**

62 Referred to by Decleris, above n 16.

63 This law "demands a controller with a variety of responses that can match the variety of the environmental information". "Given that the environment is dynamic and not completely understood, the controller must learn and adapt." Quoted from Lars Brede Johansen and Annik Magerholm Fret "An organisational

It is natural for a lawyer first to look at national legislators for the exercise of such control over human conduct. National law is the primary legal instrument which can be enforced to control human conduct. But sustainability relates to the entire global biosphere. Following Ashby's Law, the controlling system should therefore be global as well as national. Nations are only components of global society and at the same time ecologically borderless. One nation can be affected ecologically by human conduct somewhere else on Earth without the affected nation having any jurisdiction or control over it.

Here one thinks of international law. It could, in principle, have the same coverage as the biosphere. However, two gigantic flaws are obvious here. One is the familiar weakness of the slow consent-based processes by which international law is developed. The second is that implementation of international law depends upon national legal systems. As if this were not enough, it also seems that international law suffers from old environmental paradigms. For example, when it comes to the exercise of state sovereignty, the pre-environmental understanding of the *sic utere* principle applies.[64] In addition, international law is severely internally inconsistent because of a substantial amount of counterproductive law. So-called free trade law is a major example. Legal subsystems for trade puts the burdens of proof for environmental problems and proportionality on any state that tries to protect the environment through trade restrictions. It is not exactly rocket science to conclude that this legal subsystem for trade inhibits ecological sustainability in a world with growing populations, economic growth and permanently developing technology.[65]

In this context, the European Union's legal system seems to offer at least one paradox. At first glance it looks like a closer application of Ashby's Law in contrast to purely national legal systems. There are also means for achieving

approach to industrial ecology using the soft systems methodology" (1999) 1(2) Interdisciplinary Environmental Review 67.

64 **The *sic utere* principle is also known as the do no harm principle. In international environmental law it means states must not use their own territory to cause harm to the territory of another state or to areas beyond the limits of national jurisdiction (ie transboundary harms). This principle is generally held to have two key elements: (a) prevention of harm and (b) the obligation to exercise due diligence. There remains some contention about the application of this principle to global ecological systems such as the global atmosphere. See Stockholm Declaration, Principle 21: *Report of the United Nations Conference on the Human Environment*, above n 20, at 5; and Alan Boyle and Catherine Redgwell *Birnie, Boyle and Redgwell's International Law and the Environment* (4th ed, Oxford University Press, Oxford, 2021).**

65 **These conflicts are now well understood and widely written about: see the chapter on "International trade and environmental protection" in Boyle and Redgwell, above n 64.**

faster legal enforceability against persons, than under international law.[66] On the other hand, European Union law is also internally inconsistent. It seems to put one typical environmental problem in focus but solves it poorly. There are indications of a belief that environmental issues call for harmonised environmental rules. The *ecological* problem is, however, far more complicated. Since ecosystems vary geographically, the controlling legal system must be able to handle that too. This is not generally achieved with uniform (or harmonised) activity or product-related rules.

Take as an example a pesticide product that changes into something harmless after a time, in relation to temperature and other climate conditions. Even if it could be used in the Mediterranean countries without significant side effects, it could be very problematic in subarctic regions. Any law based on the idea that the pesticide could be allowed within the entire European Union is most probably incompatible with ecological sustainability of the entire European Union. If a member state in the northern subarctic regions intends to restrict its use for environmental reasons, it faces several legal barriers. In such circumstances, it is difficult to apply the precautionary principle consistent with achieving ecological sustainability.[67]

European Union law has rendered state sovereignty largely irrelevant. The European Union as a political system, on the other hand, has a decision-making structure that makes it possible for harmful environmental actors to virtually hijack the European Union Legislature and put forward law which restricts the ability of member states to control even their own environment and citizens' environmental conduct. The enactment of REACH — a European Union regulation — indicates this.[68] It is not even clear how the principle of sustainable development stands in relation to the policy of free movement of goods, for example.

66 **European Union law is primarily enforced directly by Member States.**

67 **Principle 15 of the Rio Declaration, above n 25, at 6 defines the precautionary approach in these terms: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." For a discussion of the precautionary principle see, for example, Annecoos Wiersema "The Precautionary Principle in Environmental Governance" in Douglas Fisher (ed) *Research Handbook on Fundamental Concepts of Environmental Law* (Edward Elgar, Cheltenham, 2016) 449.**

68 **REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. It is a European Union regulation (dating from 2006) for the production and use of chemicals, including impacts on human health and the environment. European Chemicals Agency "Understanding REACH" <https://echa.europa.eu>; and Regulation 1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals [2006] OJ L396/1.**

International law, and European Union law, are clearly insufficient for securing ecological sustainability. This conclusion might seem upsetting, even theoretically, because the larger the controlling system, the more it can control. The reason is at least partly because these two legal systems are — as already mentioned — internally inconsistent. Neither of them is sustainable. For one thing, they reflect conflicting goals. In addition, sustainable development is not among the highest of priorities within these legal systems. For another, they are simply too inflexible to adapt to whatever occurs in the environment for the purpose of controlling the environment for ecological sustainability.

This mega-problem is not likely to be solved, unless legal scholars stop relying on reactive research and start conducting proactive research and, in doing so, relate to the core problem of ecological sustainability and readjust legal theory accordingly. As a consequence, the ruling international and European Union law paradigms would then have to be replaced.

Legal scholars will need theory and information from other social and human disciplines.[69] It is important nevertheless to have defined the *core problem* (and consequent sub-problems) and to clearly outline a theoretical framework derived from the core problem, with which imported expedients from other disciplines must be compatible.[70] If this is not done the research will remain a simple multidisciplinary theme-based project, insufficiently proactive, locked on solutions that do not address the core problem, but is instead (at best) a project *on* the core problem without adequate theoretical framework.

5. CONCLUDING REMARKS

The object of new environmental law is ultimately the biosphere, its qualities and resources. The core problem lies in achieving and maintaining ecological sustainability as the necessary foundation for sustainable development.

69 **See, for example, Kim and Kotzé (2020), above n 54, for their discussion of the objectives and characteristics of Earth system law. For an overview of related legal developments see Klaus Bosselmann and Prue Taylor (eds)** ***Ecological Approaches to Environmental Law*** **(Edward Elgar, Cheltenham, 2017); "'Oslo Manifesto' for Ecological Law and Governance", above n 13; Cormac Cullinan** ***Wild Law: A Manifesto for Earth Justice*** **(2nd ed, Green Books, Totnes (UK), 2017); Anthony R Zelle and others** ***Earth Law: Emerging Ecocentric Law — A Guide for Practitioners*** **(Wolters Kluwer, New York, 2021); Bosselmann (2020), above n 58; and Magalhães and others, above n 54.**

70 **Earth system science, governance and law are intended to be trans-disciplinary: see Kim and Kotzé (2020), above n 54.**

Progress in solving this core problem can in principle be monitored in the physical world, though humanity will need to adjust its collective conduct and address its collective anthropogenic environmental impact, without which nature's reactions will end in ecological *un*sustainability.[71] Present theory on handling implementation deficits has begun to observe the importance of systems theory[72] and the significance of environmental control systems with built-in feedback mechanisms. This has in turn led, for example, to a theory of adaptive environmental management.[73] So far, no other theory with the same or greater capacity to illuminate and approach the core problem seems to have been presented. Even if there was, the area for proactive research in and for the future is vast.

Any theory aimed at solving the core problem must recognise the core problem as it really is, and not redefine to fit into disciplinary thinking developed for other problems. Observing the role of law and the need for economising with limited ecological and other natural resources and thermodynamics, and systems theory, science for new environmental law and for sustainable development must be proactive. It is extremely improbable that a globally applicable and fully implemented legal order for nine or more billion people will develop *without proactive legal science for ecological sustainability and sustainable development*. Therefore, it would be unscientific to rely on such a remote chance.

71 **This is becoming far more achievable through the use of Earth system science and the planetary boundaries framework (see above n 54). However, downscaling to the level of nation states and subnational government is necessary to operationalise or apply the framework in practice: see Kim and Kotzé (2020), above n 54, at [3.3]. The New Zealand Ministry for the Environment has recently published a report: Lauren Seaby Andersen and others *A safe operating space for New Zealand/Aotearoa: Translating the planetary boundaries framework* (New Zealand Ministry for the Environment, December 2020).**

72 Compare this with Decleris, above n 16.

73 Inga Carlman "Adaptiv miljöplanering nästa" in Gabriel Michanek and Ulla Björkman (eds) *Miljörätten i förändring: en antologi* (Iustus förlag, Uppsala, 2003) (translation: "Adaptive environmental planning next" in *Environmental law in change: an anthology*). **For an introduction to some adaptative management issues and environmental law see Eric Biber "Adaptive Management and the Future of Environmental Law" (2013) 46 Aakron Law Review 933. See also Rakhyun E Kim and Brendan MacKey "International environmental law as a complex adaptive system" (2014) 14(1) International Environmental Agreements: Politics, Law and Economics 5.**