UTOPIA AND GOSPEL

Unearthing the Good News in Precautionary Culture
Jaap C. Hanekamp

Born in Terneuzen in 1964, the author received his first PhD in chemistry in 1992 at the Utrecht University together with his father, who received his PhD in theology. In 1994 he left with his wife to the United States to join the University of California Riverside as a post-doc.

Back in the Netherlands, chemistry was traded in for a career with a focus on science and policymaking. Within the general theme of maintaining health, food chemistry and safety, low-level chemicals exposure, and general toxicology have his interest. Twice he functioned as an expert witness in court cases dealing with the low-level presence of banned antibiotics in foods, both of which were settled in favour of the presented science.

He published numerous scientific articles, and he also intermittently adds to public debates in newspapers such as the *Financieele Dagblad, Nederlands Dagblad, Wall Street Journal,* and specialised newsprints such as the *Global Aquaculture Advocate, Agrarisch Dagblad* and the *Boerderij*. Recently, he returned to the debate on ammonia emissions from animal husbandry by a blog on *foodlog.nl.*

Apart from his work at the University College Roosevelt Middelburg, where he teaches chemistry and the history and philosophy of science, he has his own (small) company *HAN-Research* in which independent scientific research for third party contractors is carried out. Since 2011 he is an adjunct faculty member of the University of Massachusetts Amherst School of Public Health and Health Sciences, department of Public Health, Environmental Health Sciences.

Precautionary culture proved to be a recurrent theme in his work. This book is the result of an attempt to unearth the substructures of the present day risk-averse culture and certain aspects that drive that culture. Theology delivered a fitting empirical and theoretical framework for the analysis presented.

Between 1996 and 2000 he and his wife Winie, together with their three children, foster-parented in total nine teenagers.

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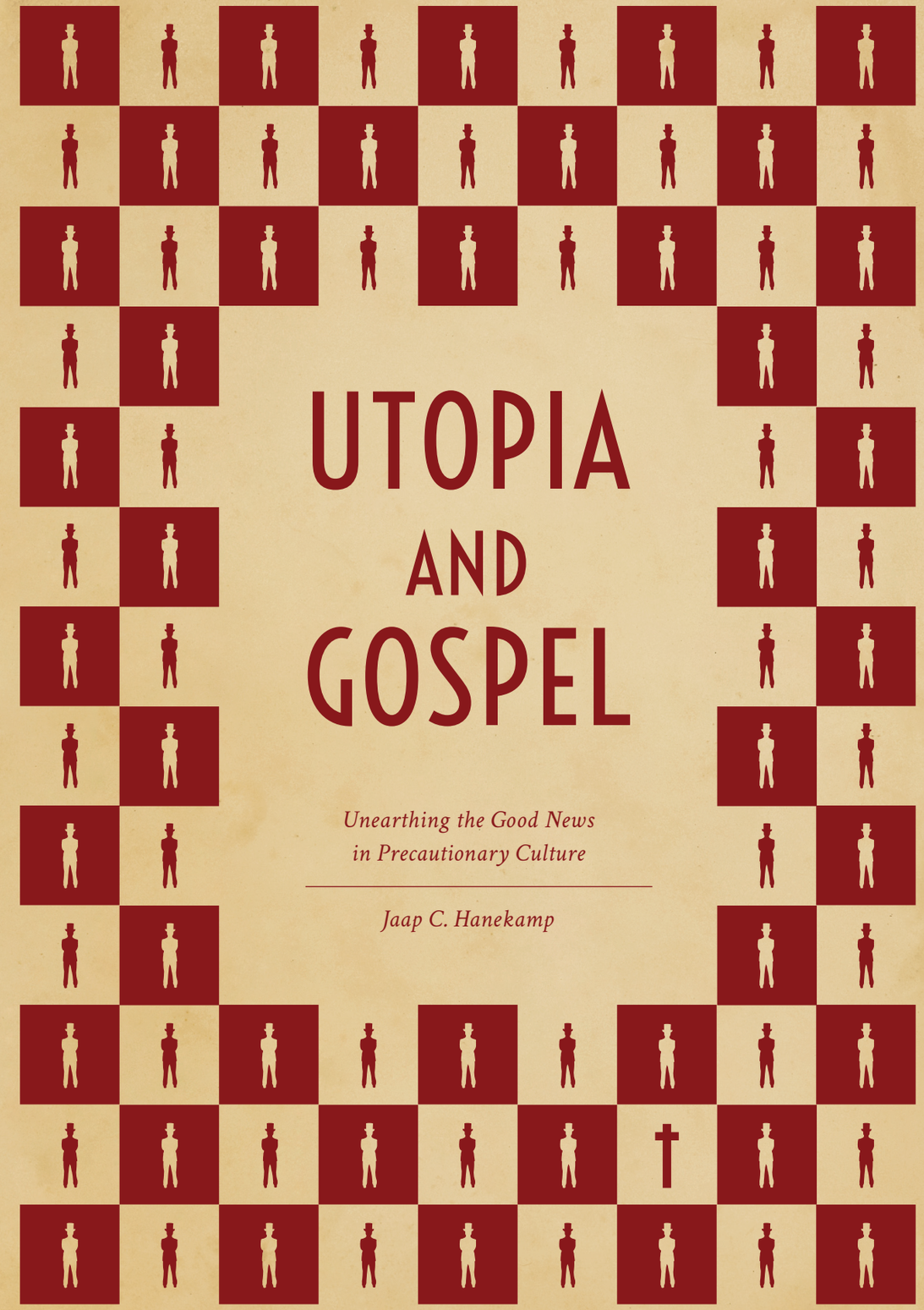

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Jaap C. Hanekamp
Zoetermeer 2015

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UTOPIA AND GOSPEL: UNEARTHING THE GOOD NEWS IN PRECAUTIONARY CULTURE

Proefschrift ter verkrijging van de graad van doctor aan Tilburg University op gezag van de rector magnificus, prof. dr. Ph. Eijlander, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op woensdag 11 februari 2015 om 16.15 uur door Jaap Cornelis Hanekamp, geboren op 28 juli 1964 te Terneuzen.

'COOPER: You're a scientist, Brand -
BRAND: I am. So listen to me when I tell you that love isn't something we invented - it's observable, powerful. Why shouldn't it mean something?
COOPER: It means social utility - child rearing, social bonding -
*BRAND: We love people who've died ... where's the social utility in that? Maybe it means **more** - something we can't understand, yet. Maybe it's some evidence, some artifact of higher dimensions that we can't consciously perceive. I'm drawn across the universe to someone I haven't seen for a decade, who I know is probably dead. Love is the one thing we're capable of perceiving that transcends dimensions of time and space. Maybe we should trust that, even if we can't yet understand it.'*
(Interstellar)

'... You'll hunt me. You'll condemn me, set the dogs on me ... because it's what needs to happen.'
(The Dark Knight)

'If I never meet you in this life, let me feel the lack.
A glance from your eyes, and my life will be yours.'
(The Thin Red Line)

PROMOTIECOMMISSIE

Promotores:
prof. dr. E.P.N.M. Borgman
prof. dr. A. Bast

Overige leden:
prof. dr. em. A. van Harskamp
prof. dr. I. Helsloot
dr. R. Pieterman
prof. dr. M. Sarot

To Martine Evita Sipman (22nd of May 1994 – 26th of December 2011)

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FOREWORD

'And everything changes and nothing can last
I'm sure you've been here
Sometimes I can't help but worry
And sometimes I can just let it go
I'm sure you've been here
The days may have names you can call, but they never come back to you
The days are like children, they change into years as they grow
They can't find their way and there's no one to show where they're going to
They play with us here for a while and so swiftly - they go' (Kari Bremnes)

The words of Kari Bremnes say it all, I guess. While I was working on this book, days indeed quietly slipped into years. Fortunately for me, and those close to my heart, those years were limited. And during that time, slowly but surely this book came into being. Therein, I tried to answer some questions that seemed pertinent at the time, some 7 years ago. My experiences of the last few months of this year, sadly, underline my analyses found in especially the first four chapters of this enquiry. Fear and uncertainty and the attempts to counter both by utopian design are pivotal in our society. The last chapters try to show a hopeful counterpoint thereto. That counterpoint is not found in the abstract of alleged clever argument, but in the person of Jesus.

Now, in the course of studying and writing, relative solitude gradually changed into a singular kind of togetherness with a few people I want to name here specifically, knowing that I cannot do justice to their input. Obviously, the possibility to actually do PhD research is always at the mercy of a professor willing and able to help a struggling fellow traveller of lesser academic distinction. In my case, two professors tagged me along.

Prof Borgman, dear Erik, I sincerely thank you for taking the time to read through my stuff and identify those aspects of my arguments that required further attention and effort. I truly admire your depth of vision and clarity of argument in our discussions we had in your office. I thank you for the time you have taken to get me to the 'finished product', and I sincerely hope we can find fruitful grounds for more cooperative work.

Prof Bast, dear Aalt, we go back a while. And we have worked and published together on quite a few subjects. But the key element here is friendship of a kind rarely found. I sincerely thank you for that and, of course, your critical eye on material you are so familiar with.

Dear Winie, we share many things in life and all in love. Some of the former and all of the latter have found their way into this book. Kari Bremnes' Norwegian lyrics adorning the final chapter you translated so eloquently best encapsulates your loving presence in my life. Yannic, Siard, and Yleana, you have contributed in your own ways to this work. The defining element here is film. The utopian/dystopian kind especially has our attention. *The Road* (2009), *Watchmen* (2009), *Spaceballs* (1987), *The Hunger Games* (2012), *Snowpiercer* (2013), and *Interstellar* (2014) are just a few of the films we have watched and discussed together. The ability of you all three to quote scripts at length is absolutely hilarious and contagious. Yannic, your cover design is spot on; I am so proud that it graces my book.

Mum and dad, you both have been a steady and loving factor in my life and, since February 2007, have courteously hosted me at your 'bed and breakfast' in Zeeland. Your life's histories have influenced me in untold ways. Mum, your entrepreneurial heritage has given me the courage to try to work on my own terms, and I can't thank you enough for that. Dad, your critical and academic eye on this work, as a theologian, pastor, and

friend, has been invaluable and humbling. I will remain forever an indebted amateur in theology.
John, good friend and companion in faith, your insightful observations on this subject and on many other issues crossing our associative minds, your enthusiasm and boundless energy and love are truly infectious. Ron, you are a friend of vision and depth I can't match. My sincere thanks to you for keeping me on track and pointing me towards the right theological habitat in which I indeed thrived. I am honoured that you both accepted to aid me in my public defence as paranymph. That our life's paths may cross frequently and intimately.
Roel, you truly have been a friend not shy, where I failed in thought and word, to speak your mind. And you have, and I have become the better man for it. I can't thank you enough for all your efforts and patience. Winie and I hope to enjoy your company at the dinner table many times over.
Finally, this book is dedicated to Martine Sipman for reasons I cannot express in full, and I thank my friends Annemarie en Geert, her parents, for graciously allowing me this dedication. In Martine's final months, in which my family and myself drew close to her and her family, I was unexpectedly embraced by an abounding nearness. That experience had a myriad of consequences, for one cementing the relationship between the professional and the personal in this book, the love needed to do research as Michael Polanyi so insistently emphasised. The prayer she received at the end of her life voices the immersive and anticipatory hope submitted in the last chapter. The closing part of her prayer reads: '… don't be afraid as our Lord has conquered death in this world, in us, in you, forever.'

Jaap C. Hanekamp
Zoetermeer, December 2014

01.
RESEARCH TOPICS

'I worry, I weigh three times my body
I worry, I throw my fear around
But this morning, there's a calm I can't explain
*The rock candy's melted, only diamonds now remain' (John Mayer)**

THESIS STRUCTURE AND SCOPE - PREMISES

'Sure some hazardry
For the light before
and after most
indefinitely'
(Bon Iver)

In this admittedly eclectic study, a number of topics come together that focus on the so-called precautionary culture, very concisely the ideal of a harm-free society. The precautionary outlook, which is usually portrayed with the aid of the precautionary principle that states that 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, is regarded as the lodestar to a safe, secure and sustainable future. Sustainability typically is characterised as the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The central tenet that will be developed in this enquiry is that:

In recognising Jesus as the resurrected God Incarnate, the general utopian character of precautionary culture specifically can both be exposed and critiqued. Furthermore, this understanding of Jesus will provide an anticipatory perspective on life that is transcending both suffering and death, the very borderlines the precautionary/sustainable perspective cannot surpass, merely postpone. In the New Testament, this anticipation takes the form of hope.

This tenet will be expounded in a number of ways. Firstly, we will show that precautionary culture at heart is utopian in character, that is the material hope for harmony of demonstrably true ends for all humans, at all times and places in the past, present and future. Secondly, the documented failures of utopian projects in human history entail that precaution, if it is the newest expression of utopian endeavouring, is likely to fail as well. Through exemplar and reasoning we will examine this potential for failure. Thirdly, we will investigate the source of Utopia in human history, that is the life, words and works of Jesus. Consequently, the failure of Utopia, and its potential implications for precaution, implies, it is argued, a non-utopian reading of the New Testament. That reading takes Incarnation and resurrection as genuine aspects of the reality of God's work in our world: the hope embodied in Jesus' life, death and resurrection. Overall, the actuality and failure of the utopian projects requires Jesus to be genuinely in touch with us here and now, not just linguistically or nostalgically. The position then attained gives leeway to an understanding of human life that is transcendent and hopeful in this world, generating perspectives on human action that will foster genuine stewardship of creation that is fully reliant on God.

INTRODUCING PRECAUTIONARY CULTURE

'What about the age of reason?' (John Farnham)

'THOSE WHO SEEK SPECIFIC DESCRIPTIONS OF THE "GOOD SOCIETY" WILL NOT FIND THEM HERE. A listing of my own private preferences would be both unproductive and uninteresting. I claim no rights to impose these preferences on others, even within the limits of persuasion. In these introductory sentences, I have by implication expressed my disagreement with those who retain a Platonic faith that there is "truth" in politics, remaining only to be discovered and, once discovered, capable of being explained to reasonable men. We live together because social organization provides the efficient means of achieving our individual objectives and not because society offers us a means of arriving at some transcendental common bliss. Politics is a process of compromising our differences, and we differ as to desired collective objectives just as we do over baskets of ordinary consumption goods. In a truth-judgment conception of politics, there might be some merit in an attempt to lay down precepts for the good society. Some professional search for quasi-objective standards might be legitimate. In sharp contrast, when we view politics as process, as means through which group differences are reconciled, any attempt to lay down standards becomes effort largely wasted at best and pernicious at worst, even for the man who qualifies himself as expert.'[1]

James McGill Buchanan, an American economist and the 1986 Nobel Prize laureate in economics, minces no words in his *The Limits of Liberty*: finding truth in politics that will hold for everyone, everywhere and for all times, is a futile endeavour not without its dangers. Moreover, in an almost tongue-in-cheek manner, he exposes expertise, when considering the standards for the good society, as simply non-existent. We will follow his thread with respect to cultural and societal developments that have dominated especially the Western world from roughly the 1950s onwards. Specifically, precautionary culture and its sustainable tenets will be the focus of the underlying enquiry.

In policies, regulations, and international conventions of all sorts, the precautionary outlook, usually portrayed with the aid of the *precautionary principle*, which states that 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,[2] is regarded as the lodestar to a safe, secure and sustainable future.[3] *Sustainability* usually is characterised as the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.[4]

Succinctly, this enquiry will address the culture of precaution in which we want to live a risk-free, long and healthy life postponing ultimate death as long as possible; it addresses the understanding and use of science in such a culture; it observes the loss of any transcending religious perspective therein and feelings of anxiety and fear; it proposes a rejoinder to this developing culture of precaution for its utopianism that reverts back to such old notions as grace, Incarnation and resurrection. All these apparently loose aspects obviously require explanation, context, and a research framework. For instance, although the term precaution is mundane enough, precautionary culture points at certain specifics of present-day societies very few people seem to be aware of or have indeed heard of at all.

THREADS – CENTRAL ASPECTS EXPLICATED

'Some might say they don't believe in heaven Go tell it to the man who lives in hell' (Oasis)

Preliminary notions

As said, precautionary culture and its sustainable tenets will be the focus of the underlying enquiry. Both terms have a closely intertwined history that roughly emerges some 50 to 60 years ago. From that time onwards, the Western world was and is increasingly confronted with facts and stories about anthropogenic-induced degradation of nature, environmental pollution, and threats to human health.[5] Roughly from the

middle of the 20th century, the race for a sustainable world that will, at long last, be able to overcome anthropogenic environmental degradation, war, poverty, disease, hunger, climate change is on.[6] Taken as a whole, a '… vision of unity –which is not a vision only but a hard and inescapable scientific fact– … part of the common insight of all the inhabitants of planet Earth, … to build a human world' is forcefully put forward in the current debate. 'In such a world, the practices and institutions with which we are familiar inside our domestic societies would become, suitably modified, the basis of planetary order.'[7]

These visions of a sustainable world future were not developed in poverty-stricken intellectual communities, far from it. They mostly stem from individuals and institutions that are part of the modern Western societies, not hampered by communal diseases, lack of food, or health-threatening environmental ills.[8] In point of fact, members of the societies where these visions spawned *are* privileged to enjoy and value their health, wealth, safety, security, and longevity.

As material needs were met for most people in Western societies, the logic of wealth distribution that has shaped the Western world (and is still shaping the developing world) lost its immediate relevance, assenting to the logic of risk distribution, specifically moulded in terms of precaution and sustainability.[9] Despite this ostensible rational shift of focus, a society in which its members, as said, are fortunate to enjoy and value their health, wealth, safety, security, and longevity, subsequently and paradoxically is gripped by the hazards and potential threats unleashed by the exponentially growing wealth-producing industrial forces that mark the later stages of modernisation. Some have remarked that the increase of wealth and health is paralleled by the rise of uncertainty and fear amongst wealthy Western world citizens.[10]

Previously, during the early stages of modernity, the hazards of science and technology were, unsurprisingly, not prioritised because the overriding societal concerns were how to cope with poverty, hunger, and disease. As Ulrich Beck famously précised: 'The driving force in the class society can be summarized in the phrase: *I am hungry!* The movement set in motion by the risk society, on the other hand, is expressed in the statement: *I am afraid! The commonality of anxiety* takes the place of the commonality of need."[11] On the whole, the secularised industrial western world has developed into a *risk society* characterised by a precautionary culture.[12]

Damage, as the crucial function of the precautionary equation, is regarded as something that has to be foreseen and forestalled, indeed eliminated.[13] Being mistaken about outcomes of human activities, products, and interventions that could be detrimental to humans and/or the environment now or in the future, even accidents, should be minimised up to the point of eradication.

A *British Medical Journal* editorial for instance states that '… most injuries and their precipitating events are predictable and preventable. That is why the *BMJ* has decided to ban the word accident.'[14] In a similar vein, it is noted elsewhere that '[t]he goal for replacing the term *accident* must be that the event be understood as the consequence of a causal chain of facts and circumstances in which the subject always can intervene to avoid its occurrence or to mitigate its consequences. That is, as a *preventable fact*.'[15] Incurred damage, as a preventable instance, is, consequently, a *disgrace*.

Precautionary culture brings together damage and disgrace in a new way.[16] Being mistaken is nowadays a theme that is deeply embedded with the moral connotation of a disgrace of the societal system as a whole, even though, undeniably, '[n]ature has established patterns originating in the return of events, *but only for the most part*.'[17] This is a key statement in the discussion about our future. Without the italicised qualification, the world would be predictable, and there would be no *uncertainty* and thereby no *risk*.[18] The whole issue of precaution would vanish into thin air.[19] But it is quite the reverse; precaution is the central theme on our way to tomorrow.

This signifies that despite the oft-heard cliché that 'nothing is certain', certainty and security have become societies' holy grail of which science and technology paradoxically are the guides *par excellence*, as is our collective experience from industrial society and its risk culture. The uncertainty of time and future rise to the surface here (see below).

'An ordinary miracle
Is all we need
An ordinary miracle
You and me'
(The Blue Nile)

Three lines of enquiry

Three lines of inquiry are embedded in a theoretical framework that centres on the purported utopianism of precautionary culture.

(I) Precaution is seen as the guiding societal principle with respect to uncertainty, hazard, and risk that accompany the fear and anxiety that are part and parcel of our culture. The rise of precautionary culture, the application of the precautionary principle exemplified in four contemporary usages, and a critique, are addressed in chapter two and three. We here centre on 'time-uncertainty', that is the ambiguous future of humankind in an uncertain world;

(II) Precautionary culture imbues science with scientistic requirements, which will be examined in chapter four in some detail;

(III) A theological critique centred on the life, works, and words of Jesus, capable of challenging the utopian-dystopian outlook of which precaution seems the newest modification, is considered in chapter five and six. Chapter seven rounds up the arguments put forward in this enquiry.

(I) The utopian prospects of precautionary culture –'a toxic-free society',[20] 'guaranteeing safe foods', 'eradicating poverty and terrorism', 'no more hunger', and the like- imposes a dystopia of the present as is the structure of the utopian dialectic.[21] The hazards and risks of modernity, the plights of the present world and its precarious future, *need* to be portrayed and experienced on an all-encompassing dystopic level so as to capture the hearts and minds of contemporary world citizens to let the societal systems managers strive for this better world, which is christened sustainable.[22] Here, time-uncertainty plays out specifically, as the uncertain future needs to be attenuated in precautionary and sustainable terms.

James Scott identifies four historical elements of state-initiated utopian social engineering that could be useful here: (I) the simplified 'administrative ordering of nature and society'; (II) the 'high-modernist ideology', that is the 'self-confidence about scientific and technological progress', a 'faith that borrowed the legitimacy of science and technology', whereby it became 'uncritical, unskeptical, and thus unscientifically optimistic about the possibilities for the comprehensive planning of human settlement and production'; (III) the rise of an 'authoritarian state that is willing and able to use the full weight of its coercive power to bring these high-modernist designs into being'; (IV) the rise of a 'prostrate civil society that lacks the capacity to resist these plans.'[23] Although the revolutionary fervour with its social engineering of the 1950s and 1960s all but petered out, usually seen as a result of the dissolution of Christianity, in precautionary culture the discourse of social engineering is again introduced, albeit in all-embracing contours. The Christian eschatological perspective is traded in for the utopian precautionary perspective of sustainability, despite the fact that the latter is no more than the pitiable orphan of the former. Nevertheless, the former continues to be the crucial facet of the latter regardless. As a result, precautionary culture instigates a type of dualism that to some extent equals, for lack of a better term, Gnosticism. The romanticism of the pastoral ideal thus is infused into our culture. The latter is another aspect of the precautionary discourse we will interrogate.

(II) Another part of the precautionary discourse is related to science and its ostensible cultural privileged status as the primary source of authority in relation to decision-making, which warps science into scientism.[24] The scientistic attribute of precautionary culture should bear out under close inspection.

Overall, our era could well be called the age of assessment.[25] With the help of varied scientific fields, the paths towards precautionary requirements mentioned above are charted. This development within the sciences carries scientistic traits, that is the idea that science alone is deemed to be capable of elucidating and resolving genuine human problems (poverty, social inequity, global warming, pollution, food safety, and etcetera) whereby all human affairs are reducible to science.[26]

Despite its inherent provisional nature, outcomes of scientific

FINDING TRUTH IN POLITICS
THAT WILL HOLD FOR
EVERYONE, EVERYWHERE
AND FOR ALL TIMES,

IS A FUTILE ENDEAVOUR

NOT WITHOUT ITS DANGERS.

research are to be understood as a belief (as in trust) that provides an unquestionable and full account of the truth of reality as is. Thus scientism has found fertile soil in precautionary culture. Simultaneously, science has become increasingly acquiescent to the culture it helped spawn. Contemporary culture is committed to what science delivers,[27] notwithstanding its inherent and well-documented fallibility.[28]

Another aspect of the scientism feeding off of precautionary culture is related to the predominant naturalism found in the sciences. This layer of scientism will have our attention as to formally bridge the purported gap between 'theology and the world'.

(III) Lastly, we will look at a viable route of critique. Two tacks of this critique need to suffice here; in the final paragraph this point will be developed further. On the one hand, it is clear that the human ability to be precautious in an overarching manner has its real-world risk- and uncertainty-inducing tradeoffs. As Scott observes: 'The great high-modernist episodes … qualify as tragedies in at least two respects. First, the visionary intellectuals and planners behind them were guilty of hubris, of forgetting that they were mortals and acting as if they were gods. Second, their actions, far from being cynical grabs for power and wealth, were animated by a genuine desire to improve the human condition – a desire with a fatal flaw.'[29] We will substantiate this by a few precautionary examples.

Conversely, as Zygmunt Bauman observes, there is a connection between existential fears most Westerners experience with substitute-fears that allow some form of control: 'Unable to slow the mind-boggling pace of change, let alone to predict and control its direction, we focus on things we can, or believe we can influence …. We are engrossed I spying out 'the seven signs of cancer' or 'the five symptoms of depression', or in exorcising the spectre of high blood pressure, a high cholesterol level, stress or obesity. In other words, we seek to *substitute* targets on which to unload the surplus existential fear …. Each next revision of the diet in response to a successive 'food panic' makes the world look *more* treacherous and fearsome, and prompts *more* defensive actions – that will, alas, add more vigour to the self-propagating capacity of fear.'[30] These aspects of the critique are embedded in a larger framework centered on anticipation and hope elaborated on in the closing paragraph of this chapter.

LIFE AS ANTICIPATION – CHALLENGING FEAR AND THE UTOPIAN RESPONSE THROUGH HOPE

'I should have
seen the signs
They were right
before my eyes
He could have
saved my soul'
(Aim feat. Kate Rogers
-Rae & Christian
Remix)

The lines of enquiry stated above engender a perspective that unearths firstly the upsurge in fear and anxiety witnessed in contemporary societies and secondly the rationality of risk distribution and the utopian aids in the form of precaution and sustainability as the purported workable answers. The central tenet we have stated above clarifies the second aspect as well as counters the first.

Concomitantly, the widely accepted scientistic assertion that 'nature is enough' –that is that this life and all that it contains is all there is whereby life's transcendence is denied- feels for not a few like a prison-sentence,[31] and has its injurious consequences for the life-politics people embrace. Ironically, the attempt to bring utopian order to ultimate cosmic disorder (according to the followers of scientism),[32] is nothing other than postponing the chaos that at last will engulf us all in death.

Notwithstanding the overwhelming presence of the materialistic outlook on life in contemporary culture, the *anticipation* of life's fullness above and beyond the material, cultural, and societal tenets we now live by is possible.[33] More than just an attempt to explain, we will thus propose a viable route out of the utopian-dystopian impasse. If we allow for the notion that the human spirit has already transcended, in principle, the limits of nature, then life can be understood as anticipatory.

In the New Testament, anticipation of this fullness of being, transcending suffering and eventually death, takes the form of hope.[34] The culmination of this enquiry, as defined in the basic tenet above, will focus on the life, death, and resurrection of Jesus as found in the Gospels, as he is to be understood, I contend, as the embodiment of that hope. This is probably

best expressed by the frequently uttered command in the Bible to 'not be afraid';[35] or on a more individual level, Jesus is said to '… free those who all their lives were held in slavery by their fear of death.'[36] Simultaneously, the history of Utopia is profoundly informed by the New Testament utterings about Jesus that are left unfulfilled in his death on the cross, and thereby in the final analysis up to human implementation. By considering the history of Utopia as potentially epitomised in precautionary culture, Jesus as coming to us through the Gospels is best understood as God Incarnate, that is that Jesus embodies in his own actions, his own journey to Jerusalem and what he would do there, and supremely in his own death, God himself.[37] Thus, it is proposed that a Christological understanding of Jesus[38] emerges form the history of Utopia. This route also requires some remarks on the characteristics of being human, especially with respect to the philosophy of mind. Insights on that level will bolster the viability of the anticipatory character of life we mentioned above. Overall, the following strata will emerge in this enquiry:

(I) The Christologically informed anticipatory mind-set is a viable alternative to Utopia;
(II) Paradoxically, Utopia is moulded by New Testament utterings concerning Jesus, his life and works;
(III) Considering the history of Utopia, however, little justice is done to Jesus' life and works, his death and resurrection, as especially the latter gives actual and primary substance to the anticipatory character of (human) life that simultaneously stands as a critique against Utopia.

We will thus submit an argument that is focussed on the life, death, and resurrection of Jesus that is able to challenge Utopia, now potentially exemplified in precautionary culture, to the full, *if* Jesus is to be understood at all. Utopia thus appears to be the forlorn mirror image of Jesus.
At the close of this chapter, a caveat is called for with respect to what an argument such as developed in this enquiry, or a set of arguments –philosophical, theological or otherwise- can accomplish. What at the maximum one can hope for in general is that arguments will be decisive in favour of one's conclusions. Specifically, a decisive argument is an argument so strong that, with respect to all inquirers, the argument is such that they ought to embrace the conclusion. However, the difficulty is that by this standard, very few philosophical arguments can succeed at all. Generally, this is because in assessing complex arguments, numerous considerations are relevant. Since we can only assess so much, 'tunnel vision' might ensue when considering only the evidence that the argument (or set of arguments) expresses. Ideally, the total evidence is called for. That, of course, is out of anybody's reach. What is aimed for in this enquiry is that the arguments found in the following pages carry sufficient support.[39]

References

* Adding lines of pop song lyrics to each paragraph is a miniature reference, based on my own (limited) understanding of the songs, to the real-life issues presented here in a technical manner. The Manchester Passion, which is a contemporary retelling of the last few hours of Jesus' life using popular music from the pick of the bunch of Manchester bands, was a pointer. The event was broadcasted live from Albert Square, Manchester at 9 pm on Good Friday, the 14th of April 2006.

1 Buchanan, J.M. 1975. *The Limits of Liberty: Between Anarchy and Leviathan.* The University of Chicago Press, Chicago, p. 1.

2 See http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163&l=en (last accessed on the 15th of November 2014).

3 Commission of the European Communities. 2000. *Communication from the Commission on the Precautionary Principle.* Brussels.
The precautionary principle has been incorporated in more than 50 multilateral agreements. Trouwborst, A. 2002. *Evolution and Status of the Precautionary Principle in International Law.* Kluwer Law International, The Hague.

4 The here used definition for sustainability is best known and is to be found in World Commission on Environment and Development (WCED). 1987. *Our Common Future.* Oxford University Press, Oxford.

5 See e.g. Hanekamp, J.C., Frapporti, G., Olieman, K. 2003. Chloramphenicol, food safety and precautionary thinking in Europe. *Environmental Liability* **6**: 209 – 221.
See further Grübler, A. 1998. *Technology and Global Change.* Cambridge University Press, Cambridge.

6 See e.g. the UN Millennium Development Goals.
See for an illustrative and entertaining website on a collection of end-of-world scenarios www.exitmundi.nl (last accessed on the 15th of November 2014).

7 Ward, B., Jackson, L., Dubos, R., Strong, M.F. 1972. *Only one Earth: the Care and Maintenance of a Small Planet. An Unofficial Report Commissioned by the Secretary-General of the United Nations Conference on the Human Environment.* W.W. Norton & Company, New York, London, p. 219 – 220.

8 See e.g. Wackernagel, M., Yount, J. D. 2000. Footprints for sustainability: the next steps. *Environment, Development and Sustainability* **2**: 21 – 42.
Wackernagel, the author behind the well-known idea of the ecological footprint (Wackernagel, M., Rees W. 1996. *Our Ecological Footprint. Reducing Human Impact on the Earth.* New Society Publishers, Canada), idealises poverty in his 2000-contribution. He found what he called a 'model society' in Kerala, in the south-west India. Here people have a life expectancy of about 70 years, a high level of literacy and an income of (sic!) one dollar a day. According to Wackernagel, three ideals of sustainability have been accomplished here: almost Western levels of health, literacy and 'low consumption levels'. He did not mention, check or observe that his model-society in reality is full of dire social ills: alcoholism, poverty, foeticide, gender selection and unemployment.
See Wadhwa, S. 2004. …And He Can Keep It. *Outlook India* **12th July**.
See also the famous report to the *Club of Rome*: Meadows, D.H., Meadows, D.L., Jorgen Randers, J. and Behrens III, W.W. 1972. *The Limits to Growth; A Report for the Club of Rome's Project on the Predicament of Humankind.* Potomac Associates, New York.
See further Verstegen, S.W., Hanekamp, J.C. 2005. The Sustainability Debate: Idealism versus Conformism – the Controversy over Economic Growth. *Globalizations* **2(3)**: 349 – 362.

9 Hanekamp, J.C., Verstegen, S.W., Vera-Navas, G. 2005. The historical roots of precautionary thinking: the cultural ecological critique and 'The Limits to Growth'. *Journal of Risk Research* **8(4)**: 295 – 310.

10 See e.g. Mol, A.P.J., Spaargaren, G. 1993. Environment, Modernity, and the Risk-society: The Apocalyptic Horizon of Environmental Reform. *International Sociology* **8(4)**: 431 – 459.

11 Beck, U. 1992. *Risk Society: Towards a New Modernity.* Sage Publications, London, p 37.

12 Beck, U. 1986. *Risikogesellschaft. Auf dem Weg in eine andere Moderne.* Suhrkamp, Frankfurt.
In 1992 this book was published in the English translation, note 11.

13 Raffensperger, C., Tickner, J. 1999. (eds.) *Protecting Public Health and the Environment: Implementing the Precautionary Principle.* Island Press, Washington DC.

14 Davis, R.M., Pless, B. 2001. BMJ bans "accidents". *British Medical Journal* **322**: 1320 – 1321.
See also Evans, L. 1993. Medical Accidents: No Such Thing? *British Medical Journal* **307**: 1438 – 1439.

15 Neira, J. 2004. The Word "Accident": No Chance, No Error, No Destiny. *Prehospital and Disaster Medicine* **19(3)**: 188 – 189. Italics in original.

16 Pieterman, R. 2001. Culture in the Risk Society. An Essay on the Rise of a

Precautionary Culture. *Zeitschrift für Rechtssoziologie* **22(Heft 2)**: S.145 – 168.

17 Bernstein, P.L. 1996. *Against the Gods. The Remarkable Story of Risk*. John Wiley & Sons, Inc. New York, p. 329. Italics added.

18 The origin of the word risk is disputed. Some believe it to be derived from either the Arabic word *risq* meaning 'anything that has been given to you [by God] and from which you draw profit' or the Latin word *risicum* that refers to the challenge posed by a barrier reef to a sailor. The *Oxford English Dictionary* suggests risk dates as a word from the 17th century, with the origin thought to be from the Italian *risco*, *riscare*, *rischiare*. Others link the emergence of the word and concept with early maritime ventures in the pre-modern period (whereby Spanish and Portuguese words spilled over to the English language) referring to sailing into uncharted waters. For instance, the Spanish word *risco* refers to 'a rock', or one root of the term risk in the original Portuguese means 'to dare'.
Taken from: Althaus, C.E. 2005. A Disciplinary Perspective on the Epistemological Status of Risk. *Risk Analysis* **25(3)**: 567 – 588.

19 I will not delve into the issues of determinism, free will and the like. Although highly interesting, this is beyond the scope of this enquiry. See e.g. Kane R. (ed.) 2002. *The Oxford Handbook of Free Will*. Oxford University Press, Oxford.

20 With this remark I refer to the Swedish environmental goals that impacted European legislation up to a point. Since 1968, Sweden has realised that most of the country's environmental problems originate from outside its borders (Sweden is not a major player within the chemical industrial field), and hence to ostensibly improve the country's environment it has to be internationally active. Domestic environmental policies 'are increasingly designed with a deliberative view to the possible impact on EU policymaking." (Liefferink, D., Andersen, M.S. 1998. Strategies of the "green" member states in EU environmental policy making. *Journal of European Public Policy* **5(2)**: 254 – 270).
In 2000, the Swedish environmental objectives were defined as follows (Summary of Gov. Bill 2000/01:130):

> 'The outcomes within a generation for the environmental quality objective *A Non-Toxic Environment* should include the following:
> The concentrations of substances that naturally occur in the environment are close to the background concentrations.
> The levels of foreign substances in the environment are close to zero.
> Overall exposure in the work environment, the external environment and the indoor environment to particularly dangerous substances is close to zero and, as regards other chemical substances, to levels that are not harmful to human health.
> Polluted areas have been investigated and cleaned up where necessary.'

Löfstedt sees Sweden's environmental ambition reflected in EU's regulation (Löfstedt, RE. 2003. Swedish Chemical Regulation: An Overview and Analysis. *Risk Analysis* **23(2)**: 411 – 421):

> 'In the work building up to the 1992 Rio Conference on sustainable development, Sweden was one of the most active participants. Because of a Swedish initiative, chemicals received a separate chapter, largely based on Swedish chemical control policy (the substitution and precautionary principles). In 1994, the Swedish government organized a conference on chemicals, which in turn led to the establishment of an Intergovernmental Forum for Chemical Safety. When Sweden was negotiating its membership in the EU in 1994, Sweden was granted a four-year transition period during which the EU pledged to review its own legislation …. In fact, ever since Sweden joined the European Union it has been highly active in pushing for an international review of chemical policy. Following a Commission meeting in Chester in 1998 and an informal meeting of the Environmental Ministers in Weimar in May 1999, this objective became a reality.
> In the development of the European Commission's White Paper "Strategy for a Future Chemicals Policy" (CWP) Swedish regulators took a lead role, promoting, among other things, the reversed burden of proof requirement (European Commission. 2001. White paper: strategy for a future chemicals policy. European Commission, Brussels). As such, the differences between this White Paper and the recent Swedish document *Non Hazardous Products: Proposals for Implementation of New Guidelines on Chemicals Policy* are hardly discernable. One of the most important elements of the CWP is that future regulation of chemicals should be based on *hazard, not risk*—a prominent feature of Swedish chemical control policy that argues that chemicals are persistent, bioaccumulative, and should be phased out regardless of what actual risk they may pose …..'

See further Wallström, M. 2008. *Chemicals – The Achilles heel of our society.* Gothenburg Award for Sustainable Development. Gothenburg, Sweden 12 November 2008.

21 See e.g. Achterhuis, H. 1998. *De erfenis van de Utopie.* Ambo, Amsterdam. [*The Legacy of Utopia.*]

22 Marx, L. 1964. *The Machine in the Garden. Technology and the Pastoral Ideal in America.* Oxford University Press, Oxford.
This is explicitly not a denial *per se* of problems related to scientific and technological expansion, on the contrary.

23 Scott, J.C. 1998. *Seeing Like a State. How Certain Schemes to Improve the Human Condition Have Failed.* Yale University Press, New Haven, p. 4 – 5.

24 Rayner, S. 2006. What drives environmental policy? *Global Environmental Change* **16**: 4 – 6. Italics added.

25 Rayner, S. 2003. Democracy in the age of assessment: reflections on the roles of expertise and democracy in public-sector decision making. *Science and Public Policy* **30(3)**: 163 – 170.

26 Stenmark, M. 2001. *Scientism. Science, Ethics and Religion.* Ashgate Publishing Limited, Aldershot, England.

27 Jones, W.E. 2003. Is Scientific Theory-Commitment Doxastic or Practical. *Synthese* **137**: 325 – 344.

28 We need to make, perhaps superfluously, a distinction between a scientific hypothesis and a metaphysical substantiation. It is quite clear that the latter cannot be considered as if it is the former. Ruling out metaphysics from the outset, as is habitually proposed by adherents of scientism (apart perhaps from mathematics and scientific reasoning itself), begs the question without a proper defence. But, once a defence is mustered against metaphysics, one engages in metaphysics, thereby refuting the position from the outset. Edwin Burtt is on track when he remarks that 'the attempt to escape metaphysics is no sooner put in place in the form of a proposition than it is seen to involve highly significant metaphysical postulates. … If you cannot avoid metaphysics, what kind of metaphysics are you likely to cherish when you sturdily suppose yourself to be free from the abomination? …'
Burtt, E.A. 1932. *The metaphysical foundations of modern physical science.* Dover Publications Inc., N.Y., p. 228 – 229.
Se further Feser, E. 2008. *The Last Superstition. A Refutation of the New Atheism.* St. Augustine Press, Indiana.

29 Scott, note 23, p. 342.

30 Bauman, Z. 2007. *Liquid Times. Living in an Age of Uncertainty.* Polity Press, Cambridge, 11 – 12.

31 Haught, J.F. 2006. *Is Nature Enough? Meaning and Truth in the Age of Science.* Cambridge University Press, Cambridge, p. 23.

32 In a tongue-in-cheek 'What Do You Call A Believer In Scientism Contest' entry of Matt Briggs' blog, the winner came up with the term 'Scidolator'. Briggs commented:

> 'This portmanteau was the truest and most evocative entry. It tells you what it is without having to explain it; it is memorable, it is short and easy to say. It can be spelled. It captures beautifully the spirit of over-dependence on science. It cannot be improved upon.
> Why does 1 + 1 = 2? Science doesn't know. Why is murder wrong? Science can't tell us. Why are the fundamental laws of the universe what they are? Science is silent. Why is there something rather than nothing? Science is of no help. Why is killing an unborn child immoral? Science has nothing to say. Why is it that if All F are G and x is an F that x is G? Science is dumbfounded. What is good and what bad? Science says, "You talkin' to me?" How can free will exist in a deterministic universe? Science hasn't a clue.
> It is not only that Science cannot answer these questions now, but that it never can. All these and many more are forever beyond the reach of empiricism. There is no observation in the universe, nor can there be, nor will there ever be, which proves $e^{i\pi} = -1$. It is impossible to peer at the Unmoved Mover, yet He must be there or, quite literally, nothing would happen.'

See http://wmbriggs.com/blog/?p=10145 (last accessed on the 15th of November 2014).

33 Haught, note 31, p. 92.

34 Haught, note 31, p. 23.

35 See e.g. Mark 5: 21 – 43.

36 Hebrews 2: 15.

37 Wright, N.T. 2002. *Jesus' Self-Understanding.* In: Davis, S., Kendall S.J., O'Collins S.J., G. (eds.) *The Incarnation.* Oxford University Press, p. 47 – 61.

38 Here, I take the approach of a Christology 'from below' –roughly any method in Christology that starts with historical data directly or indirectly

referring to Jesus– more than a Christology 'from above' –roughly any method in Christology that starts with purported data of divine revelation contained in or generated by Scripture. In this enquiry I regard the history of Utopia as a datum to be used in the exploration of the person and life of Jesus. To be sure, as Oliver Crisp points out, 'it is folly to think one can have a method in modern theology that pays no attention to one or other of these two ways of approaching Christology.' (p. 29.)
Crisp, O.D. 2009. *God Incarnate. Explorations in Christology.* T & T Clark, London.

[39] Reppert, V. 2009. *The Argument from Reason.* In: Craig, W.L., Moreland, J.P. *The Blackwell Companion to Natural Theology.* Wiley-Blackwell, Oxford, p. 344 – 390.

02.
PRECAUTION
OPENING MOVES

'I heard a battle raging on the other side of the wall
I buried my head in a pillow and tried to ignore it all' (Fish)

CHAPTER'S STRUCTURE AND SCOPE

'Exposure
out in the open
exposure'
(Peter Gabriel/
Robert Fripp)

THROUGH ALL AGES PEOPLE HAVE TRIED TO DRAW THE CURTAIN BETWEEN PRESENT AND FUTURE. It is an attempt to enter a territory hidden from common mortals. However, an unsurpassable barrier between the now and the future, time and eternity, prevents our getting in and, perhaps, even words fail us to describe this inaccessible world. The uncertainty of future time is the subject of many a speculation, projections or predictions.
In this chapter we will exanimate the latest attempt to smooth this barrier between present and the uncertain future. This attempt, precaution, has emerged with the modern conception of risk. Precaution signifies an action taken beforehand to protect against *possible* danger, failure, or injury. Precaution, as is understood nowadays, essentially takes prevention a critical step further, by deciding not to postpone physical, legal or political intervention to prevent potential damage on the grounds that scientific evidence of a potential causal hazard chain is limited or even absent.
Here we will delve into that conception and render precaution in its legal framework and its real-world expression through the portrayal of a number of examples wherein precaution plays a crucial role. Furthermore we will examine precaution's link to sustainability, that term made famous by the Brundtland-commission in the 1980s.
We will show by example that despite the laudable outlook precaution tries to create, it in fact instigates the opposite, that is it amplifies uncertainty and cumulatively demands regulatory interventions on an increasing scale, whereby regulatory technology is put in place with its own hazards and uncertainties. We begin however with a miniature excursion to ancient Egypt and from there we go to Mesopotamia, Israel, and on to the modern concept of risk.

INTRODUCTION[1]

'See the heart of man
in a pagan place'
(The Waterboys)

Of God(s) and men, ...

In prehistoric times the sungod Amon-Re was king on earth till the day the Pharaoh succeeded him on the throne. The sungod, so the canon goes, had put him on his throne to reign as exalted king. The Pharaoh was the incarnated god and, according to the official royal dogma, as omniscient as the sungod Amon-Re. He was the personification of the divine insight whose eyes search the hearts of every living soul.
Of course the Egyptians knew quite well that the Pharaoh was a mortal man with physical and psychical limitations. He himself experienced his imperfections. After the unmasking of a plot against his life, Amenemhet I (12th Dynasty 2000 – 1970) remarked: 'I was not prepared for it. I had not foreseen it.'[2]

In the battle of Kadesj (1299 BC), Ramses II (19th Dynasty 1304 – 1237) is surrounded by enemies and he invokes Amon: 'Behold, we are alone in the midst of the enemy, for the archers and chariots have left us. Let us return, that our lives may be saved. Save us, O my lord, Rameses Miamun!'[3]

Centuries later and far off in the east, king Nebuchadnezzar II (605 – 562 BC) ruled over Babylonia. Once he was haunted by dreams he could neither retrace nor explicate. He summoned the magicians, enchanters, sorcerers and astrologers to tell him his dream and its interpretation. Their response was quite recognisable: … 'There is not a man on earth who can do what the king asks! No king, however great and mighty, has ever asked such a thing of any magician or enchanter or astrologer. What the king asks is too difficult. No one can reveal it to the king except the gods, and they do not live among men.'[4]

In Israel the king is Jahweh's servant: 'I have found David my servant; with my sacred oil I have anointed him.', sings psalm 89, and 'He will call out to me, 'You are my Father, my God, the Rock my Savior'.' But the psalm gives no assurance that the king thereby has gained knowledge of future events. David did not foresee that his love affair with Bathsheba and the death of Uriah, Bathsheba's husband, displeased the Lord so much that it had far-reaching consequences. God sent the prophet Nathan to announce the king that 'the sword will never depart from your house, because you despised me and took the wife of Uriah the Hittite to be your own.'[5]

Besides pharaohs and kings, prophets play a prominent part in ancient daily life. They are a group of people who have the gift to foretell the future. The prophet belongs entirely to his god and it is his task to obey him.[6] He is respected and feared, for the message he has to bring encroaches on one's life, sometimes on a whole nation. When Samuel entered Bethlehem 'the elders of the town trembled when they met him' and asked 'Do you come in peace?"[7]

But even prophets were sometimes ignorant of the facts. When the Shunammite boy died, Elisha the prophet complained that Yahweh had hidden it from him.[8]

As shown above the future is not, and can never be, *ours* in the direct sense. In ancient times the gods were invoked to spell the future, which in modern times is at best a futile attempt and at worst a ludicrous and irrational exercise. Although we will see that the boundary between modern times and the (ancient) past lies with the mastery of risk, and thereby 'knowledge of the future', the lines are not drawn as straight as one might think.

In the New Testament, Luke (chapter 14) gives two statements of Jesus, which are clear examples of a form of risk analyses: [28] 'Suppose one of you wants to build a tower. Will he not first sit down and estimate the cost to see if he has enough money to complete it? [29] For if he lays the foundation and is not able to finish it, everyone who sees it will ridicule him, [30] saying, 'This fellow began to build and was not able to finish." [31] 'Or suppose a king is about to go to war against another king. Will he not first sit down and consider whether he is able with ten thousand men to oppose the one coming against him with twenty thousand? [32] If he is not able, he will send a delegation while the other is still a long way off and will ask for terms of peace.' Beforehand both the builder and the king, mindful of the proverb 'Look before you leap', calculate the risks they may run in their projected endeavours.

For millennia, risk remained in the domain of trial and error, but in the course of time, mathematicians showed interest in this subject. Blaise Pascal and Pierre de Fermat laid the foundation for the probability theory that was needed to develop the modern concept of risk. Since then that modern concept of risk and thereby the knowledge of future events has become an integral part of our daily life. The future is no longer disguised under a complete veil of ignorance or the playground of the gods. According to Peter Bernstein this new conceptual device created a historical watershed:[9]

> 'What is it that distinguishes the thousands of years of history from what we think of as modern times. The answer goes way beyond the progress of science, technology, capitalism and democracy. …
> The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. Until human beings

discovered a way across that boundary, the future was a mirror of the past or the murky domain of oracles and soothsayers who held a monopoly over knowledge of anticipated events. …
The ability to define what may happen in the future and to choose among alternatives lies at the heart of contemporary societies. Risk management guides us over a vast range of decision-making, from allocating wealth to safeguarding public health, from waging war to planning a family, from paying insurance premiums to wearing a seatbelt, from planning corn to marketing cornflakes. …'

'Well, maybe there's a god above But all I've ever learned from love Was how to shoot somebody who outdrew you' (Jeff Buckley)

… and precaution

The revolutionary idea that defines the boundary between the past and modern times, Bernstein proposes, is the mastery of risk. It is the notion that the future is more than a whim of the gods and that men and women are not passive before nature, as if they are merely pawns on the chessboard of life and its gods. Human beings discovered a way across that boundary via the tool of probability calculus.[10] The future was not a mere reflection of the past or the murky domain of oracles and soothsayers who held a monopoly over 'knowledge' of anticipated or feared events. Probability calculus was the device that the kings of the *Ancien Régime* used to calculate their future populations with regard to their military and financial needs. But probability also and quite significantly led to the development of insurance schemes, first of all with regard to shipping, life insurance and fire insurance.[11]
Now, before we continue, some clarification of terms is required, which overall represent the incertitude of life and human actions. Apart from the historical background of the term *risk*,[12] one formal definition is that it is a condition under which it is possible both to define a comprehensive set of all possible outcomes *and* to resolve a discrete set of probabilities across the array of outcomes. Here, the related term is *hazard* (and also *danger*), that is the *potential* for creating damage to humans, the environment, economic values, and the like.[13]
By contrast, the term *uncertainty* applies to a condition under which there might be confidence in the completeness of the defined set of outcomes of a certain activity, but where there is no valid basis, theoretical or empirical, for the allocation of probabilities to these outcomes. Lastly, there is the condition of *ignorance*. This applies to circumstances where it is both problematical to assign probabilities (as under uncertainty) and to delineate a complete set of outcomes. Here, it is not only impossible to rank the options, but even their full characterisation is problematic. Under a state of ignorance, it is always possible that there are effects (outcomes) that have been totally excluded from consideration.[14] In the discussions that follow, these three terms will be used, at some level, interchangeably as the boundaries between these terms are somewhat fluid when considering real-life issues. The following (simplified) story is illustrative of some of the terms:[15]

'Three people crossing the Atlantic in a rowboat face a hazard of drowning. The maximum societal hazard in this case is three deaths. Three hundred people crossing the Atlantic in an ocean liner face the same hazard of drowning, but the maximum societal hazard is 300 deaths. The risk to each individual per crossing is given by the probability of the occurrence of an accident in which he or she drowns. The risk to society is given by the size of the societal hazard multiplied by the probability of the hazard. Clearly the hazard is the same for each individual, but the risk is greater for the individuals in the rowboat than in the ocean liner.'

The ability to define what may happen in the future, to choose among alternatives, and to insure against damage and disease, lies at the heart of contemporary societies. In the 20th century we have seen a development of industrial society in which *risk culture* increasingly dominated our outlook on life. Risk culture, on the whole, shows great trust in scientific knowledge as a reliable tool to predict and control the future, especially through insurance schemes, either privately or publicly, and the development, implementation and

diffusion of technology. Insurance is best viewed as an overarching social, economic and also political technology in part based on scientific knowledge and used to increase our control over the future. Science, technology, and insurance, subsequently, have dominated the twentieth century and together they, roughly, shaped the Welfare State.[16]

Apart from the rise and diffusion of science and technology in society, as to make risk culture a reality, damage required quite a different appraisal than the time-honoured conception thereof. Overall, we could denote the culture that preceded risk culture as *guilt* culture. In such a culture, damage is seen as the consequence of a lack of prevention exerted *by the victim*. Normally therefore, victims are expected to bear their own losses and learn from the experience. To suffer damage is thus seen as *a moral lesson at the individual level*, and is not in a few instances described as the consequence of 'sin'. Moreover, the misfortune of the one serves as a moral lesson for the many.

Straightforward compensation for this deficit in the quality of prevention and its, in this particular case, disastrous consequences would only lead to further moral decay as it takes away the responsibility of the victim; such is the attitude in guilt culture. Therefore the law, before the 20th century, erected high barriers for those who seek compensation from others. Only when the victim is not to blame whatsoever and the damage is entirely the result of the morally wrong actions of some guilty other, is that guilty party held liable for the incurred damage.[17] Part of the story in the 9th chapter in the Gospel of John gives ample illustration of this perspective on damage: '[1]As he went along, he saw a man blind from birth. [2]His disciples asked him, "Rabbi, who sinned, this man or his parents, that he was born blind?"'

Risk culture, as opposed to guilt culture, no longer subscribes to the idea that damage is the result of some morally wrong action attributable to a guilty (sinful) individual. Damage is seen as the unavoidable side-effect of some *useful* activity. This way of thinking clearly developed pertaining to accidents in the industrial workplace during the last decades of the 19th century.[18] *Damage* and *disgrace*, therefore, are separated in risk culture. Risk culture expounds modern optimism as it shows great trust in scientific knowledge as a reliable tool to predict and control the future. The development of industrial technology, which undeniably creates specific risks in the working place and beyond, is valued in risk culture as long as the price paid for produced goods exceeds the costs of prevention and of compensation.

Risk assessment and management of industrial society ostensibly guides us over a vast range of decision-making: from allocating wealth to safeguarding public health, from waging war to planning a family, from paying insurance premiums to wearing a seatbelt, from planning corn to marketing cornflakes. Indeed, we take it for granted to secure our life-chances and to make arrangements for the future. What's more, legislation guarantees all the more certainty in the fields of employment, social welfare and health care. To insure oneself through many a public and private system has become a standardised and routine part of our modern way of life, which is of crucial importance to us to plan ahead, even, if at all possible, many decades. However, the kind of security here depends for the greater part on economical developments, which in its turn affects our outlook upon life.

Superficially, it seems that all can be known and calculated from past and present experiences. We may consider them as the real building blocks for a wide range of future purposes and projections. Yet lest we forget, precautionary culture expresses a strong desire for a predictable world.[19]

The idea that modern Western world citizens perceive the world as predictable and controllable can be illustrated with the aid of the work of John Searle,[20] although he himself did not focus on the issues discussed here. He makes the informative division between (I) purely natural phenomena (e.g. a stone, a mountain), (II) artefacts (e.g. a knife, a house), and (III) social institutions (e.g. marriage, property). The historical trend in the development of human society is that artefacts and institutions have become increasingly influential for the fate of humans whereas natural phenomena have diminished in importance. Increasingly, it is social reality that dominates human existence, not natural reality.

This social reality is constantly (re)constructed and in this (re)

construction *knowledge* –moral, religious, political, legal or scientific– is the central feature. Conversely, in this framework, the artefacts and institutions created *by* humans in the interests *of* humans present the greatest risks *to* humans. Hence, risks have to be understood as being a creation of human activities. These risks customarily involve an amalgamation of natural phenomena (e.g. snow), artefacts (e.g. ski slopes) and institutions (e.g. 'avalanche watchers'). Therefore, even the most natural of perilous occasions like storms, earthquakes, volcano eruptions, and tsunamis are no longer seen as merely natural phenomena threatening human life and property. They are considered to fall under human scrutiny and prediction. The human environment, and thereby its risks, is almost entirely perceived to be social, and thereby predictable and controllable.

An interesting example of the consequences thereof is that six Italian seismologists and one government official have been tried for manslaughter of those who died in the earthquake that struck the city of L'Aquila, Italy, on 6 April 2009. The seven were on a committee that had been tasked with assessing the risk associated with recent increases in seismic activity in the area. Following a committee meeting just a week before the quake, some members of the group assured the public that they were in no danger.[21] As of the 22nd of October 2012, the Italian scientists and an ex-government official have been sentenced to six years in prison over the 2009 earthquake on the charge of multiple manslaughter. However, the seismologists were cleared of manslaughter on the 10th November 2014. An appeals court overturned their six-year prison sentences and reduced to two years the sentence for a government official who had been convicted with them.[22]

As this example at least hints at is that being mistaken nowadays is a theme that is embedded within the moral connotation of *disgrace*. Prevention no longer is enough. The distinction between prevention and the main focus of this enquiry will be discussed below.

PRECAUTION *VERSUS* PREVENTION

'The can things with
the sharp little edges
That can cut your
fingers when you're
not looking
The soft little things
on the floor that you
step on
They can all be
DANGEROUS'
(Frank Zappa)

As the lyrics of *The Dangerous Kitchen* by Zappa show, one can never be too careful. The song has an absurd quality that is not easily missed when you actually hear it. The music intensifies the text, till it saturates your mind. *The Dangerous Kitchen* features on the album *The Man from Utopia*, which was published in 1983, and poetically summarises a perspective now dominant in our Western World culture: precaution.

Precaution seems a harmless, even prudent word of common usage and is ostensibly synonymous with the term prevention. However, they should be distinguished for the purpose of understanding precautionary culture in general and the establishment and implementation of the precautionary principle in particular. We will concern ourselves with the latter below first, after which we will address precautionary culture.

Prevention usually means avoiding damage rather than remedying it after the damaging event. The damage to be avoided is clearly defined as resulting from a specific process or product in a causal chain of events: cutting one's finger in a food processor; injury caused by a car crash; food poisoning as a result of consuming food-borne pathogens such as *Salmonella enteritidis*, and so forth. Thus, prevention entails putting in place measures to ensure, up to a certain degree, that an already identified danger cannot materialise, or to reduce its likelihood.[23] When the Allies liberated Europe, the local population was often warned not to enter meadows, woods, or go along the verge of the roads, because of possible enemy mines. The warning written on many a message board in Europe in those days tells a bitter story: 'If you pass this point, you've had it'.[24]

Nowadays industrial designers, being aware of possible dangers of their products, try to reduce or avoid accidents. Food processors will not function if fingers can touch the blades; national and local officials prohibit to travel at more than a specified speed; industrial procedures (e.g. *HACCP – Hazard Analysis and Critical Control Points*) are implemented preventing canned meats being infected with pathogenic micro-organisms.

Precaution on the other hand means an action taken in advance to protect against *possible* danger, failure, or injury. Precaution, as is understood nowadays,[25] essentially takes prevention a critical step further, by deciding not to postpone physical, legal or political intervention to prevent potential damage merely on the grounds that scientific evidence of a potential causal hazard chain is limited or even absent. Thus, taking precautionary measures means that regulation of some sort will be introduced at an earlier stage, or that more stringent regulation will be introduced, or that an existing regulation will be applied to ban a product or process even before it is certain that a potential danger *will*, or indeed *can*, materialise.[26]

Precaution can best be explained through the so-called precautionary principle, which has materialised, more or less, in the past five decades, that is from the 1960s onwards. The inherent uncertainties with which human activities are imbued with are the focus of this principle. The precautionary principle is not so much a means to simply reduce uncertainty as is common within preventive strategies and principles. The fulcrum of precaution concerns (scientific) uncertainty about harm as a result of human action: 'Modern-day problems that cover vast expanses of time and space are difficult to assess with existing scientific tools. Accordingly we can never know with certainty whether a particular activity will cause harm. But we can rely on observation and good sense to foresee and forestall damage.'[27] In other words, precaution ostensibly grants us the possibility to preclude damage, or at least err on the side of precaution of human (in)action.

PRINCIPLES OF PRECAUTION

'A connecting principle Linked to the invisible Almost imperceptible Something inexpressible Science insusceptible Logic so inflexible Causally connectible Yet nothing is invincible' (The Police)

The precautionary principle roughly became an explicit tenet of environmental policy in West Germany during the early 1970s. At the core of the German concept of the so-called 'Vorsorgeprinzip' (which literally means 'forecaring-principle') was the belief that society should seek to avoid environmental and health damage by careful forward planning, deterring the course of potentially harmful activities. Critically, the Germans viewed 'Vorsorge' as a means of stimulating innovation and social planning for sustainability, rather than simply a tool to block potentially dangerous activities.[28]

On an international level, the principle was first introduced in 1984 at the *First International Convention on Protection of the North Sea* held in Bremen, Germany: 'Precautionary measures for air quality control by reduction of emissions at source should also be determined for the protection of the North Sea, based on the best available technology.'[29] It subsequently emerged as a doctrine cognisable by international policy-making (if not international law) at the *Rio Summit* in 1992. At the end of the *UNCED* conference, the precautionary principle was inserted in the *Declaration on Environment and Development* issued at the end of the conference, and it can be found in numerous national and international legislation and treaties.[30] It enjoys wide international support. The precautionary principle is largely shaped around health and environmental (ecological) themes related to human activities. Historically, precaution and environmental protection are closely intertwined as well (see below). The *Rio*-definition reads as follows: 'Principle 15. 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.'[31]

It is this formulation that is considered the most authoritative among the many formulations of the precautionary principle that can be found nowadays.[32] It is also known as the triple-negative definition: *not* having scientific certainty is *not* a justification for *not* regulating.[33]

Irrespective of definitions of precaution and the appreciations thereof, we will further look into below, there are a number of constitutive elements of precaution that underlie

procedure of implementation.[34] These core elements are usually formulated as follows:

(I) the triggering circumstances for the application of the principle;
(II) the timing of regulation subsequent to the triggering of the principle;
(III) establishing the burden-of-proof-distribution between the regulator and the operator with regard to the potential hazardous product/process;
(IV) choice of the type of regulation, taking into consideration cost-benefits analysis (CBA) and cost-effectiveness analysis (CEA), whereby the questions of how to weigh the consequences of false negatives and false positives, the role of expert knowledge and the content of regulation should be addressed.[35]

These procedural elements of precaution vary in content and weight with regards to the chosen definition, or modality, of the principle. Indeed, we can conceive of a continuum of *appreciations* of precaution. *The* precautionary principle, therefore, is a misnomer. At one end of the spectrum we find weak versions of the principle (comparable to preventive strategies) to which no reasonable person could object; at the other end of the spectrum we find strong versions of the principle that would appear to call for a fundamental rethinking of how society is presently organised. As Richard Stewart recognises:[36]

- *Non-preclusion Precautionary Principle (PP_1)*: Regulation should not be precluded by the absence of scientific certainty about activities that might pose a risk of substantial harm.
- *Margin of Safety Precautionary Principle (PP_2)*: Regulation should include a margin of safety, limiting activities below the level at which adverse effects have not been found *or* projected.
- *Best Available Technology Precautionary Principle (PP_3)*: Best available technology requirements should be imposed on activities that pose an uncertain potential to create substantial harm, unless those in favour of those activities can demonstrate that they present no (appreciable) risk.
- *Prohibitory Precautionary Principle (PP_4)*: Prohibitions should be imposed on activities that have an uncertain potential to impose substantial harm, unless those in favour of those activities can show that they present no (appreciable) risk.

PP_1 and PP_2 are weak versions of precaution. Unlike the strong versions (that is PP_3 and PP_4), they do not mandate regulatory action and do not make uncertainty regarding risks a default affirmative justification for such regulation. The non-preclusion variant of the principle (PP_1) in essence rejects the common law position of the unwillingness to take protective regulatory measures when absolutely proof of harm for a certain product or process is lacking. It furthermore rejects the common business stance that significant uncertainty about risks should bar the obligation of preventive regulatory controls. *The Bergen Ministerial Declaration*, for example, states that (italics added):[37]

> 'In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty *should* not be used as a reason for postponing measures to prevent environmental degradation.'

PP_1, however, does not provide confirmatory guidance as to when regulatory controls should be adopted or what form they should take. PP_2, unlike PP_1, is in fact operative only after regulators have made the choice to regulate. Once this decision is made, regulators must first determine the maximum 'safe' level of an activity, and only then authorise the activity at some degree lower than that pre-determined level (the 'margin of safety').
Considering PP_3, when regulators agree on a serious, albeit tentative, risk (whatever that may mean exactly), they subsequently *must* impose best-available-technique measures. Regulators only have flexibility in terms of the strictness of regulation. For example, the *Second International Conference on the Protection of the North Sea*, considers that:[38]

> '… in order to protect the North Sea from possibly damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence;
> … the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects ('the principle of precautionary action') …'

PP_4 is the most rigid variant on the scale of definitions. If there is an uncertain but serious potential of risk of harm (again, whatever that may mean exactly), the activity in question should not be undertaken at all unless it is proven to be safe by the proponent of the activity. PP_4 is illustrated most poignantly in *The Final Declaration of the First European 'Seas at Risk' Conference Annex I*:[39]

> 'The principle of precautionary action requires that:
> 1. the lack of scientific certainty regarding cause and effect is not used as a reason for deferring measures to prevent harm to the environment. Science, while important in providing evidence of effect, is no longer required to provide proof of a causal link between pollutant/disturbing activity and effect, and where no clear evidence is available one way or the other the environment must be given 'the benefit of the doubt';
> 2. the environmental implications of each and every planned activity are considered first – the use of the 'economic availability' reservation in the application of precautionary measures, e.g., when considering the adoption of clean or cleaner technology/production processes, is inconsistent with this, and must be abandoned;
> 3. the 'burden of proof' is shifted from the regulator to the person or persons responsible for the potentially harmful activity, who will now have to demonstrate that their actions are not/will not cause harm to the environment;
> 4. if the 'worst case scenario' for a certain activity is serious enough then even a small amount of doubt as to the safety of that activity is sufficient to stop it taking place;
> 5. potentially harmful activities are avoided where, either public debate has not concluded the activity to be a social necessity, or less harmful alternatives exist ….'

Unlike the weak versions of precautionary principle and the in general preventive approaches to regulation, the strong versions make the possible existence of uncertain risks of significant harm both a sufficient and mandatory basis for imposing regulatory controls. The economic weighing factor incorporated in the *Rio*-definition (precautionary measures need to be cost-effective; that is CEA is required)[40] –as the most authoritative of PP_3-type definitions not entailing excessive costs–[41] is rejected in the PP_4-type definition.

Moreover, in the reversal of the burden of proof, worst-case scenarios should be taken as a departure point. These worst-cases require some sort of threshold of (scientific) plausibility. However, this threshold burden is minimal, and once it is met (in terms of possibility), there is something like a presumption in favour of stringent regulatory controls. As Wybe Douma remarks: '… The default rule applied in both the EC and the WTO that the burden of proof rests with the regulating authorities, obliging them to demonstrate the existence of a risk, should be applied in a precautionary manner. The threshold of producing such proof should not be set too high. …'[42]

Conversely, the reversal of the burden of proof within the context of PP_4 shifts the explanatory obligation of the regulator to the person or persons responsible for the potentially harmful activity, who will now have to demonstrate that their actions are not causing or will not cause harm to the environment. If the worst-case scenario for a certain activity is serious enough, then even a small

amount of doubt as to safety of that activity is sufficient to stop it taking place. Although Douma envisions a minimal threshold of proof for regulating authorities, this threshold is set quite high for the parties (economic or otherwise) involved, which need to present substantial proofs of safety.
It seems that this understanding of the precautionary principle fits with the understandings of its most fervent proponents, and that with relatively modest variations, this understanding fits with many of the legal formulations as well.[43] As Chris Backes and Jonathan Verschuuren, when referring to the precautionary principle in *The Final Declaration of the First European 'Seas at Risk' Conference Annex I* as the most stringent definition of precaution (PP_4), remark:[44]

> 'The declaration reflects the opinion of the international environmental movement about the precautionary principle and thus contributes to a better definition of the principle to its gradual integration into the legal culture. This helps principles to acquire significance.'

A somewhat different approach to the appreciation of precaution makes use of a triple-distinction.[45] The initial version of precaution denotes that uncertainty does not justify inaction (PP_1). It allows for regulation despite the lack of (scientific) evidence regarding a particular hazard. The successive, and stricter, version of precaution *justifies* taking action in the face of uncertainty (PP_2). Both versions, however, do not contain any guidance on *what* precautionary actions should be taken. This brings us to the strictest rendering of precaution in which the burden of proof is shifted to the operator combined with the 'no, unless …' maxim that only lifts a ban on a process/product after proof of harmlessness is provided by the operator. This third rendering of precaution (PP_4 in Stewart's scheme) is usually criticised for its zero-risk content, which most recognise as unreasonable.[46]
All in all, the precautionary tenet does not prescribe the degree of acceptable risk and the height of the threshold of (scientific) evidence that will trigger a precautionary response as such. The precautionary principle can be defined qualitatively as 'thoughtful action in advance of scientific proof[;] … leaving ecological space[;] … care in management[;]… shifting the burden of proof[; and] … balancing the basis of proportionality.'[47] This brings us back to the procedural character of precaution we mentioned previously in this paragraph and goes above and beyond the diverse substantive appreciations we have briefly touched upon here.
Whether or not precaution holds, either substantively or procedurally, we will delve into later. First, we need to tackle the 'other side' of precaution, referred to earlier as 'ecological space'. As we will see, sustainability, the subject of the next paragraph, is intimately connected to precaution, and requires scrutiny in order to understand precaution as a whole.

THE SUSTAINABLE PERSPECTIVE OF PRECAUTION – THE 'END OF UNCERTAINTY'

'Are we the last ones left alive? Are we the only human beings to survive?' (Rush)

Those invoking the precautionary principle in essence seek to advance the timing and tighten the stringency of *ex ante* regulation. *The uncertainty of future time needs to be coped with.* On these sliding scale dimensions, regulation is 'more precautionary' when it intercedes earlier and/or more rigorously to bar uncertain future adverse consequences of particular human activities.[48] The axiom put forward in the precautionary principle is that implementation regarding risks to human health and/or the environment singularly results in the reduction or elimination of those risks. Otherwise stated, for a given human *activity* that may have a(n) (un) specified *effect* on the environment and/or human health, the precautionary principle is supposed to designate a (or should we say *the*) *remedy*.[49]
Holmes Rolston III refers to a set of limits on permissible actions that capture precaution without specifically mentioning it, arguing that corporations act ethically only if they assume that their actions are potentially harmful, and then strive to demonstrate otherwise before implementing that action:

'Chemicals, unlike persons, are not innocent until proven guilty but suspect until proven innocent. So the burden of proof shifts, and it is now up to the industrialists to dispatch it. This puts them again on the frontier, technologically and morally. …'[50] The position by Rolston mirrors the outlook as developed by Talbot Page:[51]

> 'When a regulator makes a decision under uncertainty, there are two possible types of error. The regulator can overregulate a risk *[false positive, author]* that turns out to be insignificant or the regulator can underregulate a risk *[false negative, author]* that turns out to be significant. If the regulator erroneously underregulates, the burden of this mistake falls on those individuals who are injured or killed, and their families. If a regulator erroneously overregulates, the burden of this mistake falls on the regulated industry, which will pay for regulation that is not needed. This result, however, is fairer than setting the burden of uncertainty about a risk on potential victims.'

Steffen Foss Hansen states that the costs of just one false negative –e.g. asbestos- substantially outweigh the sum of health costs in all of the identified false positives. He subsequently concludes that the 'risk that an original precaution based decision later turns out to have been unnecessary is a risk that decision-makers have to be willing to take. The reason is that the potential consequences of being wrong about something harmful can be far more severe than the consequences of being wrong about something being harmless.'[52] In this perspective, the precautionary principle can be viewed as the core principle for achieving a sustainable (global) society where the risks, which ill-considered scientific and technological developments might present for contemporary and especially future generations, are curbed in various precautionary ways. The hopes are that the precautionary principle will generate a new (environmental) law system with universal breadth that will protect the present and future generations against the uncertain environmental and health risks associated with the highly and technologically evolved production methods and consumption patterns. Precaution therefore is regarded as the lodestar on the road to sustainability.

Perhaps the most notable contemporary regulatory example of sustainable development is the worldwide attempt, governed mainly by the Kyoto Protocol, to limit damage to the environment by cutting greenhouse gas emissions, mainly carbon dioxide.[53] The signatories are convinced that prudence is required to prevent damage to the world's climate systems, in order to ensure that the environment indeed has a good future and that it should not be further shaken by recourse to technologies whose effects were controversial or uncertain. A technology that might be inimical to sustainable development should perhaps not be used at all, or used only moderately, or subject to certain safeguards.
Now, sustainability is not an easy goal to define or indeed comprehend. Many societies have been sustainable only by regular adaptation. Refraining from technical or political reform because of doubts about its sustainability could be a prescription for 'never trying anything new'. In this context, the environmental historian John McNeill notes that history offers many examples of apparently unsustainable societies that nevertheless endured for long periods of time.[54]
The *World Commission on Environment and Development*, named after its chairperson the then prime minister of Norway Gro Harlem Brundtland, defined sustainability most famously as 'the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional changes are made consistent with future as well as present needs.'[55] However, many more definitions are in existence –over 60 have been tallied–[56] adding to the complexity of the issue.
In the past, as is the common perspective, the impact of human societies on the physical world is regarded as relatively limited. The unprecedented scientific and technological developments of the last two centuries have made it possible for man to damage not only (large) sections of the globe we inhabit, but the globe itself.[57] However, the negative effects of these developments on human

health or the environment are not always apparent at once. Few would have predicted a century ago what the motorcar has done to change the world, or that asbestos might have fatal effects on factory workers.

When King James the Sixth of Scotland (and First of England) published his 'Counterblaste to Tobacco', his was probably a minority opinion. Nowadays, the medical profession worldwide would echo his condemnation of smoking as 'a custome lothsome to the eye, hatefull to the Nose, harmefull to the braine, dangerous to the Lungs, and in the blacke stinking fume thereof, neerest resembling the horrible Stigian smoke of the pit that is bottomelesse.'[58] Conversely, those who foresee dire consequences from innovation may be mistaken. It was asserted during the 1920s that frozen food could be harmful to health, but that genuine controversy had a far less significant impact than the debate over, say, mobile telephones today.

Precaution and sustainability are closely related to each other (see e.g. *The Bergen Ministerial Declaration* above). As such, the precautionary principle impresses upon us a moral obligation to take care of the environment, of humankind, our children, and our children's children. Indeed, as stated by the *European Commission*: 'The dimension of the precautionary principle goes beyond the problems associated with a short or medium-term approach to risks. It also concerns the well-being of future generations.'[59]

The precautionary principle carries a profound intergenerational perspective on anthropogenic activities and its potential future catastrophic consequences, especially with global scale. Therefore, precautionary regulation has also found its way into areas other than environmental issues, such as food safety (see below),[60] energy conservation, but also in international armed conflict. Pre-emptive military activities such as in Afghanistan and Iraq distinctly bear precautionary characteristics as well.[61] Another example that lies in the military sphere is US National Security Agency's broad surveillance of Americans' phone records as a means to prevent future terrorist attacks on American soil. We will, however, have our focus on public and environmental health issues with respect to the functioning of precaution.

Nevertheless, the military/security themes mentioned here underlines even further the pervasive nature of precaution, and the ostensible importance of the interconnectedness in time and space of human actions. This is clearly exemplified in the closing sentences of Kerry Whiteside's *Precautionary politics*:[62]

> 'Most important, the precautionary principle reflects the realization that the whole community now embraces not only fellow citizens in one's own nation-state but also people across the globe and their successor generations. Precautionary politics means that we must take responsibility for maintaining the robustness of the intricately interconnected ecological systems that sustain life on this planet – even when we are far from understanding all the conditions that make them thrive. Never before has so much wisdom been required of humanity's slowly advancing capacity for political association.'

The issues of sustainability and precaution are defined in an intergenerational anthropocentric manner when considering influential documents such as *Our Common Future* and the *Rio Declaration*. Intergenerational anthropocentrism is the view that people's behaviour toward nature should be evaluated on the basis of how they affect both present and future human generations. However, there are other perspectives possible that are not just anthropocentric,[63] and it is clear that different perspectives generate different policies. We will however not explicate the differences and evaluate the consequences thereof, as it is outside the scope of this enquiry. Therefore, reflections on precautionary culture and its principle that are developed in this study will refer to policies that carry implicitly or explicitly the intergenerational anthropocentric perspective. As stated in the 1st and 3rd Principle of the *Rio Declaration*: 'Principle 1. Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. … Principle 3. The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.'

The *World Commission's* report states that 'hope for the future is

conditional on decisive political action now to begin managing environmental resources to ensure both sustainable human progress and human survival.'[64]

The goal of an intergenerational anthropocentric policy on sustainability is to ensure that the natural resources are used in a proficient and farsighted manner so that the needs of present and future human generations can be satisfied and even expanded. The focus is to create an ecologically sustainable development in which the human population can thrive. Indeed, the latter required, according to the *World Commission*, a certain minimum economic growth as to alleviate 'pressure on the environment' because of absolute poverty: 'Given current population growth rates, this would require overall national income growth of around 5 per cent a year in the developing economies of Asia, 5.5 per cent in Latin America, and 6 per cent in Africa and West Asia.'[65]

In a sense, sustainable development, through the expansion of precautionary culture, inadvertently and ironically tries to bring to a close future uncertainty of the fate of humanity and its global habitat. Some cases will illuminate this quixotic perspective.

PRECAUTION AND SUSTAINABILITY – A PROLEGOMENON

'There's gotta be a record of you someplace You gotta be on somebody's books' (Dire Straits)

Cases

Below, four cases will be discussed that express, in varied ways, the precautionary outlook. The cases are on the one hand descriptive, and on the other provided with criticism that pragmatically introduce the more fully developed analysis presented in the next chapter. The critical reflections, for ease of reference, are thus kept close to the four cases presented.

The *first* case on chemical food safety unravels the precautionary drive to eliminate certain chemical compounds, such as antibiotics, from foods. The *second* case scrutinises the so-called linear non-threshold model that undergirds the approach found in the first case. When dealing with genotoxic carcinogens, the LNT's 'no-dose no-disease' approach in toxicology is regarded as the safest (i.e. precautious) regulatory route towards chemical food safety. We will show that the LNT-model is at least an amalgamation of precautionary scientific deliberations and cautious regulatory predilections.

The *third* case takes a look at the way the European Union regulates micronutrient supplementation, and in what way precaution is interlaced in the relevant policies. The two main regulations discussed are characterised by a precautionary focus on risk whereby the potential benefits of micronutrient intake, in light of prevalent malnutrition, is ignored. Moreover, knowledge on the potential benefits of micronutrient is scientistically monopolised by the competent authorities, expressing the precautionary empowerment of bureaucracy.

The *final* case discusses the Illegal, Unreported and Unregistered (*IUU*) Fisheries regulation. Here, precaution and sustainability are closely intertwined as a means to, *laudably* I must stress, stall *IUU*. Even so, the *IUU* effort generates tradeoffs that impede the set goals, such as rising administrative burdens more effectively handled by already well-organised countries to the detriment of the less developed countries, and, inadvertently, fraud.

'You can look at the menu but you just can't eat ... No one, no one, no one ever is to blame' (Howard Jones)

Chemical *food safety* – chloramphenicol (CAP)[66] and semicarbazide (SEM)

During a lifetime, an individual consumes, on average, 30 tons of food, in endless dietary varieties. However, digestion splits all the foods found in all these different diets into the same basic nutrients: nutrients, non–nutritive naturally occurring components (including anti-nutritives[67] and natural toxins), man–made contaminants and additives.[68] Food, thus, is chemistry.

Interestingly, the focus of regulatory policy throughout the world is on synthetic (man-made) chemicals potentially present in food, whereas 99.9% of the chemicals humans ingest are in fact natural. The amounts of synthetic pesticide residues in plant foods, for example, are low compared to the amounts

of natural pesticides produced by plants themselves. Of all dietary pesticides that humans eat, roughly 99.99% are natural. These are chemicals produced by plants to defend themselves against fungi, insects, and other animal predators.[69]

A field in which precaution is deemed to be essential is food safety. With the installation of the *European Food Safety Authority* (*EFSA*), the precautionary principle was specifically referred to, and hence it takes prime position in the development of European regulation within the area of food production and consumption.[70]

One issue that has caught the publics and regulators attention is related to the use and presence of antibiotics in food-producing animals and its potential detrimental health effects. Protecting the general public,[71] e.g. from toxic chemicals, particularly carcinogens, has been a principal goal of public policy. Indeed, the *European Commission* has consistently endeavoured to achieve a *high level of protection*, among others in environment and human, animal or plant health.[72] Outlining the overarching role of precaution in food law, article 7 (p. 9) of EC Regulation No 178/2002, the precautionary principle is presented in the following terms: 'In specific circumstances where, following an assessment of available information, the possibility of harmful effects on health is identified but scientific uncertainty persists, provisional risk management measures necessary to ensure the high level of health protection chosen in the Community may be adopted, pending further scientific information for a more comprehensive risk assessment.'[73]

Because of blatant misuses, precautionary zero-tolerance had been deemed an opportune approach to ban the use of certain veterinary products, which may show up in foods as residues. Here, we will focus on toxicological issues.

With the discovery of penicillin in 1928 by Alexander Fleming, the human potential to tackle bacterial infections in both humans and animals grew immeasurably, with the downside –bacterial resistance in both humans and animals- already recognised many decades ago.[74]

Penicillin is made by the fungus *Penicillium notatum*. Yet most antibiotics we now know today are derived from *Actinomycetes*, nature's topmost *bacterial* antibiotic producers, of which *Streptomycetes* account for well over half of these commercially and therapeutically significant antibiotics.[75] The antibiotics industry is valued at roughly $ 25 billion per year.[76]

CAP (initially chloromycetin) was first isolated for therapeutic purposes by Ehrlich *et al.* in 1947.[77] A year after its isolation it proved to be quite effective against typhoid fever.[78] Apart from being used as human medication, CAP also has an extensive track record in animal food production. CAP is an efficacious therapeutic agent that has been widely used in fish farms.[79]

Despite its successful medical and veterinary history, CAP fell out of favour in the medical field because of the side-effect aplastic anaemia, a form of anaemia in which the bone marrow ceases to produce sufficient red and white blood cells. Its incidence is extremely rare but quite often fatal.[80] Nevertheless, CAP is still very widely used in low-income countries because it is exceptionally cheap. In the West, CAP is also still used, albeit mostly in topical preparations (ointments and eye drops).

The minimum dose of CAP associated with the development of aplastic anaemia is unknown. The aplastic anaemia incidence estimated by the *JECFA* (*Joint FAO/WHO Expert Committee on Food Additives*) is in the order of 1.5 cases per million people per year.[81] Only about 15 per cent of the total number of cases was associated with drug treatment, and among those CAP was not a major contributor. These data roughly give an overall incidence of therapeutic CAP-associated aplastic anaemia in humans of less than one case per 10 million per year. Epidemiological data relating to the ophthalmic use of CAP in humans suggest that this form of administration is unlikely to be connected with aplastic anaemia.[82] Because of the limited data available, however, it is unfeasible to determine a proper dose-response model for aplastic anaemia.[83]

Apart from this serious medical side effect, CAP is regarded as genotoxic and carcinogenic,[84] thereby receiving an unfavourable appraisal in the veterinary field. Even so, the available data on the genotoxicity show mainly negative results in bacterial systems and mixed results in mammalian systems. It was concluded that CAP must be considered genotoxic, but only at concentrations about 25 times higher than those occurring in patients treated with the

highest therapeutic dosages.[85] CAP is categorised by the *IARC* (the *International Agency for Research on Cancer*) as probably carcinogenic in humans; group 2A.[86]

A tolerable daily intake (TDI) could not be established for CAP due to the lack of scientific information to assess its carcinogenicity, effects on reproduction, and genotoxic activity.[87] As a result, no maximum residue level (MRL) could be established for CAP. For that reason it is not allowed in food-producing animals, including animals produced via aquaculture.

In Europe, zero-tolerance levels were in force for compounds without a MRL as found in the (now out of use) Annex IV of Council Regulation EEC No 2377/90,[88] meaning that banned chemicals should not be detected in food products at all, regardless of concentrations. This is to all intents and purposes the regulatory application of the so-called toxicological linear no-threshold model (LNT): when dealing with genotoxic carcinogens the 'no-dose no-disease' approach is regarded as the safest regulatory route.[89] This, despite the fact that such a model depicts a non-existing physico-chemical reality barred by the Second Law of Thermodynamics; entropy (the progression towards thermodynamic equilibrium) drives the inexorable diffusion (spread) of chemicals throughout the world. Concisely, the explicit goal of zero-tolerance is not risk-based but precaution-based, on the molecular level no less, as the absence of a MRL is from a regulatory point of view translated as 'dangerous at any dose' other than zero: 'When in doubt, leave it out'.[90]

As a result of increasing analytical capabilities of detection, zero-tolerance as an expression of the envisioned high level of protection has created problems. Technological advances in analytical equipment resulted in lower limits of detection whereby dwindling amounts of compounds (parts per billion and even parts per trillion) can be detected. Toxicological relevance, and thereby food safety, essentially lost its significance in this development, the epitome of which was the trade-dispute between the European Union and some Asian countries over the parts-per-billion-presence of CAP in shrimp during the first half of the 2000s.[91] The European response was the closing down of the European borders for fish products from the subsequent countries and making laboratories working overtime to analyse numerous batches of imported goods on the presence of this antibiotic. Some European countries went so far as to have food-products containing the antibiotic destroyed for precautionary reasons.

The failure of the zero-tolerance policy was to some extent corrected in 2009 by designating MRPLs (Minimum Required Performance Limit) as targets for regulatory action levels of concern for banned antibiotics (Regulation (EC) No 470/2009).[92] However, issues that are *not* resolved in this MRPL-approach on the one hand revolves around the misconceived notion that an unambiguous causal link can be made between the detection of some banned compound and illegality in food production, whereas on the other hand it is thought that some risk is incurred when exposed to low-level concentrations of chemicals such as CAP. Concerning the former, and in line with our own findings,[93] CAP has been found as a *natural* component in plant material, which is used as animal feed through which it is transferred to animal tissue.[94]

A problem similar to CAP emerged in the 2000s. In 2009 there was an increased incidence in Belgium in the detection of semi-carbazide (SEM), a marker molecule for the banned antibiotic nitrofurazone (belonging to the same, now defunct, Annex IV of Council Regulation EEC No 2377/90), in the freshwater prawns *Macrobrachium rosenbergii*. This was in contrast with all other European countries where no significant increase in SEM positive samples was reported. A possible explanation for this phenomenon was that at request of the *Belgian Federal Agency for the Safety of the Food Chain* (*FAVV – AFSCA*) all approved laboratories were asked to analyse complete prawns (meat and shell) for the presence of tissue bound metabolites of nitrofurans from December 17th 2004 onwards. This procedure is not common in other countries.

DG SANCO (the *European Health and Consumer Protection Directorate*) regards the presence of SEM as solely indicative for the illegal administration of nitrofurazone to live animals when it is found as a bound residue in unaltered/unprocessed food.[95] Nitrofurazone belongs to the nitrofuran group of antibiotics that, because of their potentially carcinogenic and mutagenic effects on human health, are prohibited within the European Union (EU) as therapeutic or

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OF THE FATE OF HUMANITY
AND ITS GLOBAL HABITAT.

prophylactic medicines in food-producing animals.[96]

Now, it has been pointed out earlier that SEM is a poor marker for nitrofurazone in light of the discovery that under certain conditions SEM in food arises from sources other than this illegal antibiotic. These sources, until now, have been found to be man-made.[97] Suggestions for a natural source were reported as well.[98] *Macrobrachium rosenbergii*, cultivated under controlled lab conditions in the absence of nitrofurazone, was shown to have SEM present in the shell.[99] *Penaeus monodon*, cultivated under controlled lab conditions, also showed the presence of SEM in its shell, albeit at lower concentrations, signifying that crustaceans might produce SEM at varying concentrations. Indeed, other wild-caught crustacean species that were tested by the research group (such as *Scylla serrata*, *Portunus pelagicus*, and *Nephrops norvegicus*) were shown to have bound SEM in the shell at varying concentrations up to 12.6 μg/kg. The source of SEM, now positively identified as a natural metabolite, is unknown as of yet.

Clearly, SEM cannot be used as a marker molecule for the illegal use of nitrofurazone. The causal legal link between the presence of SEM and the prohibited use of nitrofurazone is broken, and the corollary that if SEM is found in reported wild-caught produce, then this produce must have been cultured in the presence of nitrofurazone is untenable. The fact that SEM is likely to be a natural metabolite in crustaceans rules out the possibility to track illegal nitrofurazone-use through the use of SEM as a marker.[100]

All this should have been anticipated as most, if not all, man-made chemicals have their natural counterparts.[101] A famous example is the group of chemicals known as halogenated hydrocarbons, of which the chlorinated chemical compounds are the most notorious. Chlorine is one of the most abundant elements on the surface of the earth. It was widely believed that all chlorinated organic molecules are xenobiotic (that is man-made chemicals) pollutants, that chlorine does not participate in biological processes at all and that it is present in the environment only as the relatively benign chloride anion Cl^- (the anion of table salt NaCl).

However, it has become increasingly clear that organohalogens are ubiquitously produced in nature. Some of these compounds are produced in amounts that dwarf human production. The sum total of different organohalogens is staggering –more than 5000 different natural organic halogen compounds have been identified so far, from the very simple to the very complex– and come from widely diverging sources: marine, terrestrial biogenic, terrestrial abiotic, biomass combustion (natural and anthropogenic), and volcanoes.[102]

The past EU-practice of wholesale destruction of food considered to be contaminated by trace amounts of molecules that may well have a natural background is not only problematical for a scientific point of view, but also detrimental to human health from the perspective of food security. Precaution has exacerbated this problem by singularly focussing on the risks of low-level exposures, not taking into account the potential natural background of detected chemicals, and ignoring the issue of food-security of especially the poorer countries within and outside the Eurozone.[103] Food safety, superseding food security, is now one of the dominant public values, and the precautionary regulatory context creates a substantial and growing scientific market for safety research.

The issue of food security has been recognised in a *DG SANCO* -requested but subsequently ignored report on the future of scientific advice on food and public health. It is striking that in this report nutrition, health, and economic status are addressed jointly:[104]

> 'To have scientific analysis on a European basis is important because currently many policy makers simply consider that the answer to tobacco problems is to 'educate' the individual consumer not to start smoking. This naïve approach is evident in many other dimensions of public health, e.g. those relating to inappropriate diets in pregnancy; the substantial problems of low birth weight babies; the continuing challenge of iodine deficiency within the EU; the widespread anaemia in children and adult woman; the major issues relating to the health of Asians and other immigrant communities within the EU; the challenge of coping with escalating rates of adult chronic diseases and the huge and growing impact of the poor health of Europe's elderly. In societal terms the health impact of societal deprivation, social exclusion and poverty is now becoming a

major European issue which requires much more objective scientific analyses than are currently available. …'

The *European Food and Public Health Authority* was never to be. It is now called the *European Food Safety Authority*, which was established in 2002. Precaution has rendered the question of food-security moot.

'We're on a road to nowhere, come on inside' (Talking Heads)

Chemical food safety – the Linear Non-Threshold (LNT) model

Paradigmatically, the regulatory zero-tolerance approach (now translated in a regulatory level of concern) has its basis in toxicology (more specifically, carcinogenity) modelling. In order to fully appreciate both CAP- and SEM-cases, understanding the linear non-threshold (LNT) model A is essential (see Figure 1).[105]

The LNT-model holds that for genotoxic carcinogenic substances and ionising radiation, *any level* of exposure –except for zero- implies a health risk (see Figure 1 below).[106] Simply put, the risks of exposure to CAP through the food chain are regarded as *dose-dependent*, meaning that any dose other than zero might give rise to disease, primarily cancer. Put differently, this model, also referred to as the 'one hit'-model, holds that exposure to even one molecule or ionising photon may result, in the long run, in irreversible health damage.[107] This is why we spoke of a zero-tolerance approach: only zero exposure is ultimately deemed to be safe. The potential effects of genotoxic carcinogenic substances and ionising radiation at very low-level exposures are derived from this model as, of course, actually observing those effects in human populations would be out of the question, as these effects are simply too small. B –the linear threshold (LT) curve- is reserved for non-carcinogenic compounds, which have a threshold for toxicity. We will not elaborate on the LT-model.

The calculation of cancer risks requires some causal model of dose-response, data on exposure (or dose), and probability of response. The subsequent numerals are developed on the assumption of proportionality between very low dose and probability of response (the risk): any non-zero exposure has a non-zero probability of causing cancer. This model, obviously, becomes non-linear at higher doses because it cannot exceed one: it is a cumulative probability function of lifetime cancer deaths. Each model used in regulatory analysis generally is a cumulative distribution function (hence monotonic and linear at very low doses) such that $R = d^*SF$, where R = individual excess lifetime risk; d = exposure or intake level for the chemical likely to cause cancer; SF = route and chemical specific cancer slope factor in units of lifetime probability of cancer. This is the classical LNT hypothesis.[108]

Regulating certain chemicals in food not only requires whether an unambiguous causal link between chemical-presence and illegal conduct can be established. More importantly, it is about understanding low-level exposure toxicity. The efforts to lower the levels of detection of sought-after compounds in food increase uncertainty with regards to sources. Low levels of ecological background concentrations are present in food; CAP and SEM are examples in which we have crossed this ecological threshold analytically. As a result, the LNT-model has reached the limits of its precautionary usefulness, apart from the scientific question whether the LNT-model has ever been empirically and adequately validated. This question strikes at the heart of the precautionary notion that zero exposure denotes zero risk.

Figure 1. Toxicological models.

Already in the 1970s the US FDA acknowledged the need to validate linearity at low dose predictions for carcinogens. However, this effort revealed that the analysis of risks *lower* than only one individual in one hundred was not practically achievable for carcinogens within chronic animal bioassays. Thus, they referred to this study, performed with 24,000 mice(!), as the Effective Dose (ED01) study, also known as the 'mega-mouse study'.[109] This study was unsuccessful in validating linearity. Actually, a detailed re-analysis by an expert panel revealed an unequivocal *non-linear* dose-response for

bladder cancer with risks *decreasing* below the non-exposed control group at low exposure doses.[110]

A recent 40 000+ animal-study (rainbow trout) also pointed to non-linearity of the dose-response. In their words: 'The data presented here demonstrate that hepatic tumor response was not in direct proportion to DBP [*dibenzo*[a,l]*pyrene*] dose but fell increasingly below direct proportionality … with decreasing DBP dose. The shapes of two of the fitted curves for liver … and one of the fitted curves for stomach … display increasingly steep slopes with decreasing dose and thus may be taken to suggest that a finite dose may be reached in which there would be no observable increase above background tumor rate (slope of infinity), that is, a threshold. Although these data are consistent with a threshold interpretation, even the use of over 30 000 animals did not provide proof that a threshold was reached, or would exist, ….'[111]

In practice, therefore, the application of the default LNT-model rests on the technical ability to detect trace amounts of illegal substances of anthropogenic origin. This ability has greatly increased over the past decades. Whereas one part per million (1 ppm; 1 mg/kg; 10^{-6}) was state-of-art once, we can now detect one part per billion (1 ppb; 1 µg/kg; 10^{-9}) and sometimes even smaller amounts on a routine basis. Indeed, we have entered the realm of atto- (part per quintillion; 10^{-18}) and zeptomoles (part per sextillion; 10^{-21}) of detectable analytes.[112] Basically, this means that the zero-tolerance level derived from the LNT is shifting to ever lower exposure levels. Advances in 'cleaner' food production are thus offset by increased detection capacities. The unspoken rationality of the LNT model implies that a 'clean bill of health' can never be truly issued. Thus, LNT develops into *ad absurdum* logic as we noted in a 2012-contribution to this debate:[113]

> The logical extension of the linearity at low dose modeling is that biological response is directly proportional to dose, regardless of how low that dose may be. The irony of similarity notwithstanding, the asserted biological responses at vanishingly low doses in homeopathy are dismissed with intellectual disdain by essentially the entire biomedical community, whereas the U.S. EPA and the Food and Drug Administration assert with great institutional and legal authority that even a single molecule of a chemical or one photon of ionizing radiation ultimately can cause cancer. In 1996, Goldman[11] noted the absurdity thereof when he linearly calculated the increased risk of cancer, because of increased cosmic radiation, if the entire world population would add a 1-inch lift to their shoes ….

This is the basic scientific and regulatory assumption, even when people are actually exposed, under normal conditions, to doses several thousand fold or even several hundred thousand fold *lower* than the tested animals say, for example, through food. Additionally, a dose of various carcinogens to humans associated with a *de minimis* risk of cancer (for example the well known 1 cancer case/million/lifetime exposure) would commonly deliver many trillions (10^{12}) of carcinogenic molecules each day for a 70-year lifespan, a value approaching and at times exceeding some 18 orders of magnitude greater than the so-called proverbial single molecule.[114]

Currently, however, the most fundamental shape of the dose-response is neither threshold nor linear, but seems –for cancer- J-shaped (model C in Figure 1),[115] and hence the LNT provides incorrect estimates of low-dose risk as in the case of CAP and other banned antibiotics.[116] This J-shape (for cancer) is usually referred to as hormetic or biphasic and denotes some adaptive response of the exposed organism.[117] Hormesis is in many ways the physiological equivalent of the philosophical notion that 'what won't kill you, will make you strong'.

Hormesis is best described as an adaptive response to low levels of stress or damage (from for example chemicals or radiation), resulting in enhanced robustness of some physiological systems for a finite period. More specifically, hormesis is defined as a moderate overcompensation to a perturbation in the homeostasis of an organism. The fundamental conceptual facets of hormesis are respectively: (1) the disruption of homeostasis; (2) the moderate

1 Goldman, M. 1996. Cancer Risk of Low-Level Exposure. *Science* **271**: 1821-1822.

overcompensation, (3) the re-establishment of homeostasis; (4) the adaptive nature of the overall process.[118]

Low doses could be stimulatory or inhibitory, in either case prompting living organisms to be dissociated from the homeostatic equilibrium that in turn leads to (over)compensation. For example, heavy metals such as mercury prompt synthesis of enzymes called metallothioneins that remove toxic metals from circulation and probably also protect cells against potentially DNA-damaging free radicals produced through normal metabolism.[119] Conversely, low doses of anti-tumour agents commonly enhance the proliferation of the human tumour cells, in a manner that is fully consistent with the hormetic dose–response relationship.[120]

High doses push the organism beyond the limits of kinetic (distribution, biotransformation, or excretion) or dynamic (adaptation, repair, or reversibility) recovery. This is the classical toxicological object of research usually required as a result of public and regulatory concerns, whereby hormetic responses are by default regarded as irrelevant, or even contrary to policy interests, and therefore unlooked for. Public concern about synthetic chemicals exposure inculcates public reluctance to view hormesis as a viable description of toxicological reality. Policymakers, similarly, are eager to address this concern and see no room for exploring hormesis and the possibilities of regulatory implementation.[121]

Therefore, precautionary-driven hazard assessments incorrectly focus their primary, if not exclusive attention, on the higher end of the experimental dose-response curve in order to estimate the No-Observed Adverse Effect Level (NOAEL) and/or Lowest-Observed Adverse Effect Level (LOAEL), subsequently modelled with faulty linear assumptions whereby risks at low-dose exposures are grossly overestimated. The conjectural reduction of risk associated with the LNT –when it is the incorrect choice– does not reduce risk, relative to the alternative J-shaped dose-response model: it actually increases risk. This is the asymmetry of precaution that is implemented under the condition of default reasoning.

Therefore, policy choices *not* based on rigorous methods can neither resolve ambiguity nor increase protection. Less protection may be likely despite the large sums spent to reduce what turns out to be a phantom hazard, created by conservative (purportedly erring on the side of precaution) assumptions.

In the US, as a case in point, for cancer risk assessments, regulatory agencies (e.g., US EPA, 2004)[122] default to linearity at low doses unless '… extrapolation is based on extension of a biologically based model if supported by substantial data. Otherwise, default approaches can be applied that are consistent with current understanding of mode(s) of action of the agent, including approaches that assume linearity or nonlinearity of the dose-response relationship, or both. A default approach for linearity extends a straight line from the POD to zero dose/zero response. The linear approach is used when: (1) there is an absence of sufficient information on modes of action or (2) the mode of action information indicates that the dose-response curve at low dose is or is expected to be linear. Where alternative approaches have significant biological support, and no scientific consensus favours a single approach, an assessment may present results using alternative approaches.'

Again, the basis of our discussion here is Figure 1, which depicts the two alternatives at issue: the traditional linear-no-threshold (LNT) hypothesis and its biphasic/hormetic alternative C. The regulatory science-importance of the issue is that, as the depiction shows, the LNT excludes any benefit from any exposure; the hormetic model C allows such benefit, when it exists, to be quantified. From an analysis that uses either one or the other causal model, exposure is regulated to minimize cancer incidence or deaths. However, if the form of dose-response is conjectural –it is a guesstimate- while its alternative has both a fundamental empirical and theoretical basis –it is an inference- then it would be rational for those who are exposed and those who regulate exposure to have full knowledge of both alternatives.

When regulatory agencies focus exclusively on the harmful side of exposure at low doses, thus ignoring its beneficial effects, it negates the statutory mandate to adequately protect human health. Low probability of cancer, usually assumed by using the $1{:}10^{-6}$ lifetime probability of cancer, demonstrably leads to distorted resource allocations and to regulatory constraints that increase health risk rather than reduce it.[123] The resulting concentrations in food are not

protective *if* the correct model is the *J*-shaped hormetic curve C. Thus, the very reason for being conservative, in the classical precautionary sense, utterly fails to protect.

Overall, hormesis redefines the concept of 'pollution' and 'contamination'.[124] It questions the premise that 'pollutants' are categorically bad. This is innovative because modern environmental and public health legislation is built in large part, due to the linear models, on the moral dichotomies of good versus evil, clean versus dirty, natural versus unnatural. Chemical substances are *not* either bad or good; they are both, depending on exposure levels and adaptive responses from the exposed organisms.[125] It seems wise to adhere to the words of Ortwinn Renn here: 'With respect to hormesis it is ethically mandated that potential beneficial aspects of low exposure to potentially hazardous material are incorporated in the risk-benefit balancing procedure.'[126]

Precaution thus, as a means to forestall exposure to chemicals with a certain toxicological profile, is a flawed and unsustainable approach when considering chemical food safety in the light of the increasing capabilities of science and technology. It augments uncertainty with regards to the presence and sources of increasing numbers of detectable chemicals and proliferates public anxiety when a 'new' chemical is detected at ever-lower levels, whereby toxicological relevance is ignored. Clearly, more examples will come to the fore in the future when analytical capabilities have again raised the bar in detecting certain chemicals.[127]

'I don't want knowledge I want certainty I don't want knowledge' (David Bowie)

Nutrition and health[128]

'Interest in micronutrient malnutrition has increased greatly over the last few years. One of the main reasons for the increased interest is the realization that micronutrient malnutrition contributes substantially to the global burden of disease. … More than 2 billion people in the world today suffer from micronutrient deficiencies caused largely by a dietary deficiency of vitamins and minerals. The public health importance of these deficiencies lies upon their magnitude and their health consequences, especially in pregnant women and young children, as they affect fetal and child growth, cognitive development and resistance to infection.' Thus are the opening statements of a substantive report of the World Health Organization on food fortification with micronutrients as a means to battle micronutrient malnutrition.[129]

Now, one would think that micronutrient malnutrition is something for developing countries. That is not so. Just focussing on Europe, 10% of the population lacks in iron; 57% of the European population has an insufficient iodine intake.[130] Partly, this is related to social stratification.

Dietary–habits of the lower social classes are known to be of a poorer standard than on average would be required for a diet–healthy life–style.[131] The diet is lower in essential nutrients such as calcium, iron, magnesium, folate, and vitamin C than that of the higher socioeconomic groups.[132] Food selection is constrained by economic considerations, whereby healthy eating patterns will be necessarily compromised resulting in nutritional inadequacies. For most micronutrients, amplification of the cost-constraint results in a progressive decrease in nutrient density of the diet.[133]

Dietary imbalance is a high–risk aspect of food consumption since repetitive and limited diets increase the risk of deficiencies, resulting in the well known acute illnesses (e.g. scurvy in the case of lack of vitamin C) but also lesser known chronic afflictions (see below). Focusing on micronutrients, research efforts have, among other things, culminated in RDAs (Recommended Dietary Allowance; nowadays known as DRIs – Dietary Reference Intake) for micronutrients, defined as the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) healthy individuals in a particular life stage and gender group. The original concept of RDA was a 'goal' or 'floor' for intake below which risks of inadequacy begin to significantly increase. Research institutes and governments thus addressed the *primary* risks of undernourishment: starvation, disease, and infant mortality. RDAs, based on a specific criterion of adequacy, were designed to serve as dietary standards for the planning of food supplies for

population groups. They are estimates of the daily average amounts of essential nutrients that individuals in a population group should consume over time in order to ensure that the physiological needs of all can be met. They were originally formulated as reference standards for use by qualified individuals, who have the responsibility for assuring that food, distributed to large groups of people, would be nutritionally adequate.[134] RDAs are designed to meet the needs of healthy people and do *not* take into account special needs arising from infections, metabolic disorders, or chronic disease, and do *not* define an *optimal* level of any nutrient. The underlying intent of the RDAs is to prevent deficiency diseases and promote health through provision of an adequate diet.

Despite advancing knowledge concerning the role of food components in the prevention of more subtle metabolic damage resulting in degenerative diseases, current RDAs do not reflect this progress.[135] In the USA, this has led the *Food and Nutrition Board* (*FNB*) to invite a broad variety of stakeholders to participate in a discussion to arrive at new RDAs: 'The FNB believes that the science of nutrition has ad vanced significantly, and the next edition of the RDAs will need to reflect this progress. One consideration is expanding the RDA concept to include reducing the risk of chronic disease.'[136]

As an example of the progress of knowledge, diet is now regarded as a key factor in maintaining genomic integrity, i.e. protecting DNA from deleterious damage through cellular mechanisms such as prevention, repair or apoptosis.[137] Degenerative diseases such as cancer as well as the process of aging are partly caused by damage to DNA.[138] There is accumulating evidence that higher levels of some micronutrients are necessary for various DNA maintenance reactions, and that the current RDAs for some micronutrients appear to be inadequate to protect against genomic instability.[139] The need to set micronutrient requirements to minimize DNA damage is a way forward.[140] This also might result in the inclusion of other substances for which there is accumulating evidence that they add to a healthy lifespan, such as the polyphenolic antioxidants that have been suggested in scientific studies to contribute significantly to healthy ageing.[141]

In the light of the above, a 'metabolic tune–up through an improved supply of micronutrients is likely to have great health benefits, particularly for those with inadequate diets, such as many of the poor, young, obese and elderly. The issues discussed here highlight the need to educate the public about the crucial importance of nutrition and the potential health benefits of a simple and affordable daily multivitamin/mineral supplement. Tuning up metabolism to maximize human health and lifespan will require scientists, clinicians and educators to abandon outdated models and explore more meaningful ways to prevent chronic disease and achieve optimum health. It is becoming clear that unbalanced diets will soon become the largest contributor to ill health, with smoking following close behind.'[142]

Surprisingly, in Europe, an opposite regulatory response is underway i.e. in the form of the Food Supplements Directive 2002/46/EC (*FSD*)[143] and the Nutrition and Health Claims Regulation 1924/2006EC (*NHCR*) regarding commercial communications on foods and foodstuffs.[144] The former was implemented in order to ostensibly safeguard human health in view of the potential toxicity of excess intake of micronutrient food supplements. The latter applies to nutrition and health claims made in commercial communications, whether in the labelling, presentation or advertising of foods to be delivered to the final consumer.

The Food Supplements Directive

Focussing on the *FSD* first, essentially it takes a regulatory excess-toxicity outlook directed at avoiding false–negatives (that is choosing not to underestimate risk from overexposure to certain products). Put differently, the *FSD* regulates 'the determination of doses of vitamins and minerals that potentially susceptible individuals could take daily on a life–long basis, without medical supervision in reasonable safety. The setting of these levels provides a framework within which the consumer can make an informed decision about intake, having confidence that harm should not ensue.'[145]

This position is asymmetric and typical for precautionary culture: it assumes what actually should be proven, namely, that the health effects of an assumptive regulatory approach at avoiding false–

negatives would be superior to the alternatives. The concomitant assumption is that there are no health detriments from proposed regulation. Something –health- is gained with nothing lost –no adverse health-effects from regulation.[146] The *FSD* clearly chooses not to underestimate risk through focussing on excess toxicity in order to protect public health.

Interestingly enough, in the context of the *FSD*, health-related data of micronutrients consumption are not considered.[147] This is in line with the view, unambiguously expressed in the *FSD*, that an 'adequate and varied diet could, under normal circumstances, provide all necessary nutrients for normal development and maintenance of a healthy life in quantities which meet those established and recommended by generally acceptable scientific data. …'[148]

The reference to an adequate and varied diet as a primary source of *all necessary nutrients* is intriguing. It suggests at least that food supplements are superfluous products, if only European consumers would 'eat healthy'. The truism that we can obtain everything that we need from a balanced diet only holds if we in fact eat such a balanced diet consistently. The perspective here expounded by the EC is tautological: adequate, obviously, is by default adequate. How this adequacy can be achieved, and what that adequate diet would actually be like remains undiscussed. Moreover, factors impinging on the individual nutritional status are only partly related to the dietary intake on which the EC has its focus. Mal-absorption (genetic or otherwise) and increased nutritional requirements (e.g. during a disease period) also greatly affect the nutritional status of individuals. However, these aspects are not considered.

The *FSD* carries more than just distinct overtones of precaution with its focus on the risk of excess intake of micronutrient food supplements, whereby the Directive has a regulatory preoccupation with market failure.[149] The judgement in Cases C-154/04 and C-155/04 makes it clear that:[150]

> '*68* In those circumstances and in view of the need for the Community legislature to take account of the precautionary principle when it adopts, in the context of the policy on the internal market, measures intended to protect human health …, the authors of Directive 2002/46 [*FSD*]could reasonably take the view that an appropriate way of reconciling the objective of the internal market, on the one hand, with that relating to the protection of human health, on the other, was for entitlement to free movement to be reserved for food supplements containing substances about which, at the time when the directive was adopted, the competent European scientific authorities had available adequate and appropriate scientific data capable of providing them with the basis for a favourable opinion, whilst giving scope, in Article 4(5) of the directive, for obtaining a modification of the positive lists by reference to scientific and technological developments.
>
> *69* It is also necessary to state in that regard that, by virtue of Article 7 of Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (OJ 2002 L 31, p. 1), the Community legislature is entitled to adopt the provisional risk management measures necessary to ensure a high level of health protection and may do so whilst awaiting further scientific information for a more comprehensive risk assessment, as is stated in the 10th recital to Directive 2002/46.'

Supplement food-compounds, including those that have been legitimately marketed in one or more Member States in accordance with the relevant national regulations, will now only be marketable when an appropriate (in effect precautionary) scientific risk characterisation is performed and presented. Whether or not micronutrient supplement intake might add to the overall health of European citizens is, from a regulatory point of view, irrelevant.

It hardly needs emphasising that adverse effects as a result of food supplements intake is a more 'visible' phenomenon (if they would materialise) keeping in mind the bias for negative information about possible health risks,[151] compared to deficiency diseases that are not (and cannot be) related to any regulatory activities other than advising the populace 'to eat healthy'; a less than successful and naïve

strategy when considering the actual substandard micronutrients intake.[152] Moreover, societies' shift to a culture of precaution galvanises citizens' insistence on *advance* proof that activities and products pose no risk to human health whatsoever.[153] Research and regulation caters for this 'risk management of everything'.[154] That this risk management of everything has its downsides, specifically with respect to long-term health, again as a result of substandard micronutrients intake and the lack of focus thereon, is not on the view screen of regulators and citizens alike.

Overall, the 'risk management of everything' reflects the efforts of organisational and governmental agents, formerly engaged in the collectivisation and pooling of social and economic risks of a primary nature, to separate from *and* re-individualise their own personal risk of a secondary nature. Regulators and (scientific) experts are being made increasingly accountable for what they do and thereby become increasingly preoccupied with managing their own reputational risks. As it stands, secondary risks to reputation become as significant as the primary risks for which policies should in fact be devised. Precaution thus, in the end, empowers bureaucracy and promotes *safety in stasis.*[155]

The Nutrition and Health Claims Regulation

That precaution empowers bureaucracy and promotes *safety in stasis*, is exemplified further within the same field by the other regulatory effort we have mentioned, namely the Nutrition and Health Claims Regulation 1924/ 2006EC (*NHCR*). In the *NHCR*, two types of health claims are defined: *claims* related to 'reduction of disease risk' (article 14), and *other claims* (article 13) concerning the (physiological) role of nutrients or other substances in growth, development and the functions of the body (13.1a), psychological and behavioural functions (13.1b), and any additions of claims to the list referred to in paragraph 3 based on newly developed scientific data (13.5).

Two criteria, although requiring different types of evaluation, are considered to provide an equal amount of 'scientific certainty' regarding the validity and truthfulness of health claims with respect to certain foods and food components:

- Data should be qualified as 'generally accepted scientific evidence' (Regulation 353/2008/EC, pre-amble 2);[156]
- Data shall demonstrate a 'cause and effect relationship between consumption of the food and the claimed effect in humans (such as the strength, consistency, specificity, dose-response, and biological plausibility of the relationship)' (Regulation 353/2008/EC, general principles for the scientific substantiation 3b).

Recital 1 of the *NHCR* gives insight into the purported necessity of the above: 'An increasing number of foods labelled and advertised in the Community bear nutrition and health claims. In order to ensure a high level of protection for consumers and to facilitate their choice, products put on the market, including imported products, should be safe and adequately labelled. A varied and balanced diet is a prerequisite for good health and single products have a relative importance in the context of the total diet.'

This 'high level of protection for consumers', which is framed within the precautionary approach adopted in the EU in 2000,[157] is further defined en lieu with the European Food Labelling Directive,[158] as stated in recital 3: 'Directive 2000/13/EC generally prohibits the use of information that would mislead the purchaser or attribute medicinal properties to food.'

Overall, the *NHCR* tries to establish a Europe-wide market harmonisation regarding the use of health claims in commercial communications concerning food and food products. It envisions to honour the precautionary high level of protection for consumers through the scientific establishment of health claims whereby, so it is thought, misleading information on food products will, in all intents and purposes, be eliminated. Health claims as scientifically established by *EFSA*'s *NDA Panel (Panel on Dietetic Products, Nutrition and Allergies*) purportedly would prevent misleading information that might be damaging to Europe's public health.[159]

To connect dietary patterns (including supplementation and fortification) with human health and thereby assess benefits and risks, methods such as observational epidemiologic studies, intervention trials (Randomised Controlled Trials – RCTs), models

and simulations, *in* and *ex vivo* animal and human studies, *in vitro* research, and the like, are used. Accordingly, methods might be mechanistic in nature –e.g. elucidating metabolic pathways in animal/human studies- or methods might be phenomenological in nature –e.g. an RCT giving some insight in the efficacy or effectiveness of a certain treatment. Specific endpoints might comprise of the number of healthy life years and life expectancy, motor-, cognitive-, neurologic- and metabolic function, wellbeing, satiety and hunger, and the like.[160]

From a political, regulatory and mainstream scientific point of view, the RCT is regarded as the 'gold standard' for connecting food and health.[161] Indeed, Regulation 353/2008 identifies in the 'organisation of pertinent scientific data' a 'hierarchy of study design' where RCT's rank at the top of this ostensible scientific pyramid. RCTs thus are given legal sanction and preference with respect to the approval or rejection of certain health claims for certain foods or food products.[162] Accordingly, the European legislature has standardised the scientific inquiry into nutrition and health claims, with the *EFSA* as its monitoring body.

One of the main appeals of the RCT is that the *how*-question need not be answered and as such will not be clarified by the RCT. In other words, *how* (and *why*) certain treatments or agents give certain results might not necessarily be known, other than the fact that a certain result is actually obtained. Clearly, RCTs in the field of nutrition science are undertaken in view of evidence already gathered in other research; one cannot do a RCT in the blind. Nonetheless, RCTs themselves are not in the business of elucidating the 'how' and the 'why' of the observed effect(s) of a certain agent under scrutiny in the trial.

Unsurprisingly then, there are problems.[163] The logic of RCTs is that the circumstances 'there', i.e. in the trial itself, are ideally constructed for ensuring that the treatment/agent caused the outcome in at least some members of the RCT-study. That is, the circumstances of the RCTs are specifically designed for buttressing 'it-works-somewhere'-claims (in some members of the trial that is). But, they are by no means ideal for other purposes. Particularly, they provide no better basis for extrapolating or generalising –the very aspects that have made RCTs the regulatory 'gold standard'- than knowledge that the treatment caused the outcome in any other individuals under any other circumstances.

For policy and practice, however, we do not need to know that 'it works somewhere', that is within some RCT study-design, as that would be trivial knowledge. What we do need is evidence for 'it-will-work-for-us' claims: the treatment/agent will produce the desired outcome in *our* situation.[164] Thus, although RCTs clinch a causal role of some treatment/agent in some members of the designated study-population, they do little if anything to establish the fact that the agent under scrutiny can play the same causal role elsewhere (again, preferably 'here', in our situation). *That*, RCTs are not in the business of clinching. The deductive qualities the RCTs are allegedly famed for paradoxically do not hold outside the RCT. Therefore, the opposite is true as well: if 'it-doesn't-work-somewhere' –the RCT failed to show some treatment/agent-caused effect whereby some health claim is denied- does not imply that 'it-will-not-work-for-us'.[165] The latter, however, is not endorsed. Ironically then, the possibilities to *know* whether the European regulation concerning health claims in fact works –harmonised markets, science-driven health claims, protecting consumers from misleading information- is undermined by its very structure; at its core it unhesitatingly proliferates ignorance of a certain kind. Executing a RCT as a primary *scientific* requirement is very much like trying to learn the laws of electricity by playing the radio, to paraphrase Edward Leamer.[166] In sum, concentrating on RCTs as the *NHCR* does, the regulatory message is that the question whether the policy intervention works, in all intents and purposes is made not to matter, other than banning certain societal and economic developments for precautionary reasons!

Worse, with the launch of the *EFSA* through Regulation (EC) No 178/2002,[167] a form of scientific authority was installed, although in science 'authority' as such is one of the basic fallacies.[168] We are not naïve with respect to the reality of authority in science, but authority as a rule is of a personal nature; in science there is no such thing as a 'scientific high court' that decides on issues of method and science. Such a form of legalism –the concept of

strict adherence to law or directive- implicitly generated by the instatement of *EFSA*, -fosters scientism –that is the view that all real knowledge is scientific knowledge (see below). Nevertheless, the *EFSA* opinionates, as a cautious means to protect public health and shield the consumer from misleading information, that 'the manager frequently requires the evidence to be convincing'.[169] And that 'convincing evidence' can primarily be had via RCTs.

The notion of convincing evidence brings us to the precautionary character of the *NHCR*, despite the fact that precaution as such is not mentioned. Article 7 of the European Union's General Food Law (Regulation 178/2002/EC)[170] defines precaution in terms of the uncertainty that a food or foodstuff may possibly cause harmful effects on human health. Pertaining to food components such as micronutrients, in the *NHCR* and in line with Regulation 178/2002/EC, health claims information is understood only as a risk factor, ignoring the potential benefits of that information to the consumer. The asymmetry of such an approach can hardly be valued as precautionary, while it certainly is understood in such terms.[171]

All in all, a number of remarkable and illogical corollaries surface with respect to the implementation of the *NHCR*: (I) it is simply assumed that in order to protect public health and eradicate misleading information, potential benefits from certain foods and food-components should be rated in terms of some kind of scientific absolutes, whereby; (II) the aptitude of science to be straightforwardly transparent in its fact-finding is vastly overestimated inevitably leading to scientism, whereby, inconvertibly; (III) all nutritional data, including coming from the *EFSA* itself, becomes contentious, whereby; (IV) *ad absurdum*, virtually all research results within nutritional science, or any other scientific field for that matter, becomes moot.

Robert Heaney already pointed at these problems. He remarks that a 'general agreement to the effect that nutrition is important, despite the fact that the still growing number of failed trials of individual nutrients might suggest that no nutrient actually made much of a difference, a conclusion that is absurd on its face and ought to have alerted us to the possibility that there was something wrong with how we were investigating the matter. To provide the proof needed to sustain revised intake recommendations, we shall have to find a design better suited to nutrients than the randomized controlled trial as currently implemented, and we need to develop a series of global indices, nutrient by nutrient, which better capture the polyvalent nature of most nutrients. …'[172]

The irony is that the *NHCR* instates the very thing – misinformation- it tries to oust from the European market. In the face of 'the continuing challenge of iodine deficiency within the EU; the widespread anaemia in children and adult women … the challenge of coping with escalating rates of adult chronic diseases and the huge and growing impact of the poor health of Europe's elderly',[173] unravelling the connection between nutrition and health, and disseminating information on that growing knowledge base to the consumer, without the scientistic prerequisites critiqued above, should have top-priority.

'I'll keep a vigil in a wilderness of mirrors
Where nothing is exactly how it seems
You're reaching out, you're so close you can touch it
But it all disappears when it's always so near'
(Fish)

Food and the sustainability catch: an inside look at the Illegal, Unreported and Unregistered (IUU) Fisheries Regulation[174]

Sustainability has become a many-faceted goal comprising much more than the original idea of *Our Common Future*: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[175] However, the abolishment of extreme poverty, the very first millennium goal, remains crucially important. In this context food security means making sure that our present and future generations have access to sufficient high-quality food.

Precaution is thought to be the tool of choice en route to a more sustainable society as for instance the *The Bergen Ministerial Declaration* makes clear.[176] Equally, the *European Commission* sees the dimension of the PP going 'beyond the problems associated with a short or medium-term approach to risks. It also concerns the longer run and the well-being of future generations.'[177] We shall point out that the *IUU* – although quite a laudable policy with the essential objective to

ban unsustainable *IUU*-fisheries- generates negative side effects that incontrovertibly violate the prime objectives of sustainability and precaution.

One of the aims of the Common Fisheries Policy of the European Union is to regulate the access to and use of the waters of the European Community. In the Communications from the Commission the resolution of the Member States of November 1976, which transfers the responsibility of sustainable fisheries development to the Community, is reiterated.[178] At the *World Summit on Sustainable Development* (*WSSD*) in Johannesburg in 2002, the Community subscribed to the aim of global sustainable fisheries including the objective to maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015.

Inspired by the FAO, who have set up an international action plan in 2001 to prevent, deter and eliminate illegal fisheries (point 31d),[179] the *European Commission* started its own effort against *IUU* Fisheries in 2002.[180] The *Commission* has worked out a legal concept in relative silence and conducted several impact assessments until the first version of the *IUU* regulation was made public in 2007.[181] In the meantime a special task force of fishery inspectors was installed, guided by the *Community Fisheries Control Agency* (*CFCA*).[182] The *CFCA* inspectors were given mandates to inspect any vessel fishing under European flag on illegal practices within the European fishing zone. The *IUU*-proposal would hypothetically ensure a fully traceable international catch certification scheme throughout the whole food chain for products introduced on the EU market. Third countries that export their wild caught fishery products to the EU were given the responsibility to create a system, which would ensure full traceability of the catch towards registered vessels or fishery management organizations.

On the 29th of September 2008, Council Regulation 1005/2008 was published,[183] which announced that the implementation of the regulation was to be effected before the first of January 2010. For all the stakeholders this time span proved to be too short to prepare for the implementation. In the time left, many applications for postponement of the regulation were sent to the *Commission* by both third countries and EU member States, but all of them were declined as not to delay implementation.

The implementation-regulation 1010/2009/EC was published on the 22nd of October 2009[184] and immediately it became clear that not only the third country had to adapt their systems with respect to the issue of *IUU*, but the EU Member States as well. However, for Europe there was no regulation to deal with *internal IUU*, as was pointed out by third countries, despite the fact that Council Regulation 1005/2008/EC clearly indicated the notification obligation of both Member States and Third countries as stated in preamble 7: 'In line with the definition of *IUU* fishing, the scope of this Regulation should extend to fishing activities carried out on the high seas and in maritime waters under the jurisdiction or sovereignty of coastal countries, including maritime waters under the jurisdiction or sovereignty of the Member States.'

Within the EU, the so-called *Control Regulation* was developed alongside the *IUU* regulation but wasn't finished before the deadline. Nevertheless, it had to be put in place as to even the playing field between Europe and the rest of the world when dealing with *IUU*. This Regulation (1224/2009), which deals mainly with technical requirements of the European fleet and its control, had been announced in 2009 to regulate and control fisheries under the European flag (the third largest fisheries fleet in the world). It was published on the 20th of November 2009, and it considerably enhanced the regulatory clout of the European Fishery Inspectors.[185]

In order to create a level playing field, the *IUU* regulation demands from vessels sailing under EU flag that when their catches are processed outside the EU and return afterwards at the EU borders for re-import, it needs to be considered as a third country catch. This implies that this part of the import into the EU needs to be accompanied with catch certificates, validated by the EU member state under which flag the fish was caught. On the *IUU* information website of the *European Commission*,[186] a list of flag states was made available, which had a working certification system and in the first week of December 2009 there wasn't a single EU member state listed, indicating the lack of understanding of the *IUU*

implementation even at the level of the European Union. On the 31st of December 2009 the list of Member States was complete, yet Belgium and Italy were still absent.[187]

Considering the *IUU* certification problems within Europe itself, it came as no surprise that exporting third countries had great difficulties with *IUU*-regulation. In all exporting countries, especially where knowledge of European languages is limited, the authorities were struggling with this new set of rules. Apart from the Certificate of Origin (customs) and the Health Certificate (health), now a new set of certificates (sustainability) needed to be validated by an as of yet non-existing Customs department. It is not difficult to imagine the costs involved, which have to be paid by the exporters no matter how the certificates are issued, legal and illegal.

A country like Russia, responsible for the biggest import volume of fishery product in the EU, refused to fulfil the *IUU* restrictions and did not register on the flag state list even in January 2010.[188] The Russian authorities threatened to refuse all exports from EU countries on the basis of doubts of illegal fisheries within the EU. Since the Russian whitefish catch had been one of the main points of concern in relation to global *IUU* fisheries, the exclusion of Russia from the system would mean a complete failure of all efforts. Diplomatic channels have been activated to solve this important dispute, and on the 13th of February 2010 both could come to an agreement. As a consequence all fish that was caught under the Russian flag from the first of January to the 13th of February 2010 was *not* considered legal and has been refused for import into the EU.[189] In other third countries it appeared that many vessels (sometimes up to 60%) were registered in a non-listed flag state for economic reasons, excluding them from export to the EU and devaluating their catch for the internal market. For all those operators, the regulation came as a severe setback.

All countries have had a 'non-intended' period of grace for frozen seafood imports, because catches from 2009 did not have to undergo the *IUU* formalities. With a written declaration from the authorities confirming the catch-date in 2009 or earlier, these goods were readily accepted by all EU ports in the first months of 2010, giving the EU port-authorities some time to install the system. For fresh seafood catches the system appeared to crash completely in the first weeks of 2010, as expected, because the airports were not ready for all the formalities. Interim solutions and concessions have been put in place to keep the trade of imported fresh fish going, but for many consignments this failed. Again, like in the CAP and the SEM cases, food had to be destroyed thus increasing the risk to food security, the primary millennium goal.

Overall, the future success of the *IUU* regulation will depend on the control system, because in the final analysis all imported produce needs to be certified. But if unregistered ships will be able to bring in their cargo without supervision, then fraudulent catch certificates are easily obtainable. There has been a considerable amount of European budget made available for controlling *European* catches by the *CFCA* and other governmental control systems, but in third countries public funds for the final vessel control will be very limited. The *IUU* regulation will have to come up with a 'black list' of unregistered vessels with catch certificates being invalid. This '*IUU*'-fish, once offered to the EU, will be rejected by the competent authorities and then destroyed, or sold to 'good cause'-institutes like zoos. This last point is worthwhile, because this might in effect create an unintended market for illegally caught fish. The *IUU* therefore does not only increase the risks of poverty and hunger but also threatens others important sustainability goals such as the reduction of bribery and fraud.

Despite *IUU*'s laudable goals and the critical issues it addresses with respect to maintaining world fish stocks, the stakeholders foresaw a large administrative burden, which would create trade barriers for many third countries exporting to the EU. One impact assessment predicted considerable losses of exports from poorer third countries and the inevitable and detrimental emergence of a secondary market in fraudulent catch certificates.[190] A point of concern has been the exclusion of artisanal small-scale fisheries because of the technical difficulties involved in the certification procedures of the catches like illiteracy.

Economically and socially weak groups like small and unorganised Asian fishermen are effectively barred from exporting to the EU

under *IUU* regulation. Bigger and better organised fisheries organisations will be able to secure the necessary documents perhaps even by illegal means if that will facilitate export to the EU. This is a serious problem because fraud and bribery already are major problems in developing countries.[191] They corrupt political life and the administration of society and enhance or solidify the huge inequalities and the concomitant exploitation of the poor in those countries. Viewed from this perspective, the *IUU* is not sustainable at all, on the contrary. When third country governments fail to develop activities to rule out *IUU* activities, articles 31 to 38 of regulation 1005/2009/EC provide tools to ban these countries' wild caught products from the EU market.[192] Although safety measures are built in to keep these tools worst-case-scenario outcomes, we have learned from the EU chemical food safety measures that precautionary politics can suddenly promote regulations such as the *IUU* as powerful trade barriers.

PROSPECTS

'There's always the sun
There's always the sun
Always, always, always the sun'
(The Stranglers)

In this chapter we have set out to sketch the precautionary principle, exemplified in the four cases, from which a practical critique was teased out per case. That, of course, is not enough to formulate a durable appraisal of precaution, although more real-life cases could be produced. In the next chapter a fundamental critique will be developed that will further the aspects we have brought to the fore here.

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Bernstein's focus is on the discoveries in mathematics, economics, and psychology that enabled risk to be understood, measured, and 'mastered'. His central argument is that the concept of risk has allowed humanity *to develop from a mindset of fate to one of choice*. Advancements in understanding and measuring risk and its conversion into serviceable use have been one of the prime catalysts that drive modern Western society. To be sure, Bernstein centres only on the quantitative aspect of the concept of risk, leaving other venues uncharted.

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The *Convention on Biological Diversity* also incorporates a similar definition of the precautionary principle, when is mentioned in the preamble that 'where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat, …'
Available at www.biodiv.org/convention/articles.asp?lg=0&a=cbd-00 (last accessed on the 15th of November 2014). The references made here (and other places in this study) to legal texts and the like in which the precautionary principle is specifically mentioned (and discussed), adds to the empirical record of this enquiry.

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See www.gdrc.org/u-gov/precaution-3.html (last accessed on the 15th of November 2014).

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Despite the popularity of the 'Brundtland definition' of sustainability, already in the 18th century Hans Carl von Carlowitz coined the term 'nachhaltige Entwicklung' (sustainable development) in relation to forestry (1713). A shortage of wood was becoming problematic in Germany and the rest of Europe because of increasing population and declining stocks of wood for heating and industrial energy production. Moreover, wood was a major construction material for houses, buildings and ships. Von Carlowitz therefore proposed that in the exploitation of forests, an equilibrium between production and consumption should be maintained as to the benefit of present and future generations(!). 'Nachhaltende Nutzung' – continuous exploitation– of forests could thereby be achieved.

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Over and against anthropocentrism stands *non-anthropocentrism*, of which, again, two versions can be discerned: *biocentrism* and *ecocentrism. Biocentrism* is the view that people's behaviour toward nature should be evaluated on the basis of how they affect living beings, including humans. Hence, at least some living things in addition to humans have intrinsic value or moral standing, but since species or ecosystem are not, *per se,* living things

they lack such a value or standing. *Ecocentrism*, conversely, is the view that people's behaviour toward nature *should also* be evaluated on the basis of how they affect species and ecosystems and not merely living beings. Ecocentrists, by and large, accord a higher moral worth to biological wholes (e.g. ecosystems) than biocentrists do, who tend to emphasise biological individuals. Obviously, when considering both non-anthropocentrist perspectives, we can conceive a continuum of appreciations thereof, varying from strong to weak versions.
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(A) Humans make particular chemicals with a sole human pharmacological/physiological purpose;
(B) (A) suggests that those rationally designed chemicals will never be found as part of a certain biochemical process that differs essentially from human physiology;
(C) (B) suggests that science is capable of completely elucidating the functionalities of rationally designed chemicals whereby it is not possible that such chemicals can be part of other non-human processes in the biogeosphere;
(D) (C) implies that scientific knowledge is complete, or can be so, and will not be prone to revision or extension. This is a scientistic, not a scientific, perspective.
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Overall, 'RCTs have two wings – a treatment group of which every member is given the cause under test and a control group, where any occurrences of the cause arise 'naturally' and which may receive a placebo.' (Cartwright, 2010) Comparing both groups, in a properly designed and executed trial, gives insight in the efficacy –can the intervention work?- or effectiveness –does the intervention work when used in normal practice?- of the treatment under scrutiny.
More precisely, an ideal RCT clinches the result that the treatment/agent works somewhere. That is, if all requirements for an ideal study are met, a difference in outcome-probability between the treatment and control groups entails that the treatment caused the outcome, at least in some individuals in the population under scrutiny. Comparing both groups, in a properly designed and executed trial, gives insight in the efficacy –can the intervention work?- or effectiveness –does the intervention work when used in normal practice?- of the treatment under scrutiny.
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THOSE INVOKING THE
PRECAUTIONARY PRINCIPLE
IN ESSENCE SEEK TO
ADVANCE THE TIMING AND

TIGHTEN THE STRINGENCY OF EX ANTE REGULATION.

THE UNCERTAINTY OF FUTURE
TIME NEEDS TO BE COPED WITH.