



The Blue Economy

From Deep Ecology to The Blue Economy

*A review of the main concepts related to environmental, social and ethical business
that contributed to the creation of The Blue Economy*

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based on an original article written by the same author in 1999

If I can see beyond the green economy today,
It is thanks to the giants on whose shoulders I stand

Environmental deterioration and the imbalance between man and nature increasingly preoccupy scholars, philosophers, businessmen and policy makers alike. The disparity between rich and poor and the continuous incapacity to respond to the basic needs of all (not only humans) preoccupies many. It seems that the only sustainable phenomena of our modern time is the loss of biodiversity and our incapacity to eliminate poverty. Even though we all look reality in the eye, we seem to lack the vision and the tools to make a difference and steer our excessive consumption society in general and our competitive business world towards sustainability. Our media continue to report on the loss of forest cover, biodiversity, and human dignity. My concern has always been: in spite of the statistics showing the downward trends, what can I do to make a material difference on the ground.

Since the 1950s we have seen a series of ideas and conceptual frameworks that have emerged from studies that illustrate the disconnect between our exploitative culture and the Earth's limited resources. This document attempts to summarize the most important persons and organizations whose work has greatly influenced my present thinking on business, environment, social development and ethics. This presentation does not attempt to be exhaustive, but rather to offer a briefing on the individuals, the institutions and the concepts that have shaped and continue to evolve in theory and in practice that have inspired me to develop ZERI since the 1990s. It is with great humility that the vision and the portfolio of initiatives that I have summarized by 2010 as "The Blue Economy" have come about because I can stand on the shoulders of so many pioneers who challenged the status quo and undertook more than I could ever have done or imagined. Without their leadership, and in many cases through their mentorship, I could not stand here today.

The early pioneers in the 50s, 60s and 70s.

In his original analysis dating back to the 1950s, **Arne Næss** established a basis for what is known today as **Deep Ecology**, a term he coined in 1972. His philosophical masterpiece puts mankind back in its place: man is part of nature, not above, not separate from, nor can mankind pretend that nature is there to serve. If man would pretend this were the case, then humanity could undermine the very foundations on which it has evolved over the past thousands of years.

When I hit the brick wall in 1993, realizing that I had put all my efforts in cleaning up the rivers in Europe, simultaneously led to the destruction of the rain forests in Indonesia and the habitat of primates, it was Fritjof Capra who connected me to the work of Arne Næss who I had the pleasure of meeting when he was given a life time recognition for his work at the Swedish Royal Academy of Sciences. Our dinner discussion seemed to have lasted for years, and his readings converted me into a deep ecologist. His clarity of thought, and harmony of lifestyle and mindset contributed to the decision to give up my castle in Belgium and settle in a tea house with only one table (for my computer) as furniture. The tatami floor, the ofuro bath, the shoji windows and the view of a garden with blossoms each month of the year seemed all I needed.

Deep Ecology, by some regarded as a fundamentalist approach, offers an inclusive concept, an all-encompassing framework, which lead to several new thoughts, and variations on this main theme however it was Arne Næs who made the greatest impression on me. Perhaps the most prominent new thought leaders who formulated their insights in the early 60s are **James Lovelock's GAIA theory**, developed in dialogue with **Lynn Margulis**, the extraordinary biologist who authored the milestone book "**The Five Kingdoms of Nature**". GAIA prescribes that the Earth, Mother Earth is a unique system, a complex organ which cannot be neither dissected, nor considered separate from any of its components. This Goddess, who was admired for the first time when man flew into space, is therefore without surprise, a concept finetuned by an aerospace scientist.

Lynn Margulis made a lasting impression with her logic that shifted our biologists from the "Three Kingdoms: animal, plants and minerals" to the "Five Kingdoms: bacteria, protista, fungi, plants and animals" influenced our methodology of cascading of matter, nutrients and energy from one kingdom to the other. When I met Lynn a few times at "The Bioneers at the Bay" in Boston organized by the Marion Institute - an organization that has provided such critical support to many of my endeavors - she shaped my approach, and convinced me that we are not descendants of the apes, rather we are a symbiosis of bacteria.

The holistic thinking that philosopher Arne Næss and scientist James Lovelock identified and described, found a complementary approach in the system's thinking that led to the famous Reports to the Club of Rome: "**Limits to Growth: a report to the Club of Rome**" and "Mankind at Crossroads". The respected business executive **Aurelio Peccei** considered that the fast growth track, which was maintained by the world economy in the 60s, carried inherent

shortcomings. It was Jay Forrester from MIT who captured that well articulated inquietude of the founder of the Club of Rome into a computer model that quantified the systems dynamics in a revolutionary way. A group of young MIT students headed by Donella and Dennis Meadows, Jørgen Randers, working with Dr. Forrester established that the interlinkages were framed into a mathematical model which brought surprising results: our model of consumption leads to exhaustion of the Earth.

Arne Naess and James Lovelock published and spoke in an well-articulated manner on the issues outlined. However, their publications were only read by a few. No one stirred as much discussion with its reports as the Club of Rome did. Aurelio Peccei masterfully dominated the headlines of the media for a decade. The Club was founded just months before the May 1968 uproar. The fact that the first report was published just months ahead of the first oil crisis made the release of "The Reports to the Club" most timely. The first report to the Club of Rome became the second best sold non-fiction books, after the Bible. No other report succeeded in setting the tone and the content of public debate, both at policy and industry level. However, the Report that most influenced me was "No Limits to Learning" published in 1979, a dramatic approach to our capacity to learn - provided we use all our available resources. The three authors James Botkin, Mahdi Elmandjra and Mircea Malitza became friends over the years and even at his advanced age, Dr. Malitza continues our dialogues whenever I return to Bucarest.

Aurelio Peccei kindled that entrepreneurial spirit in me, and from the moment we met in 1979 he shaped that basic principle that we have to be the change we want to see happen, a fundamental Gandhian approach. Inspired by his wisdom and words, it became obvious that the way forward should include audacious government policies as well as innovative business models. It was such a privilege to work closely with Dr. Peccei and in the aftermath - while working on his biography - learn to know Donella, Dennis, Jørgen and Jay. Dennis and I interacted more often as we shared membership in the Club of Rome. And while he is such an eloquent speaker on the subject, Donella had the finest writing style that captured all senses.

The Extention of the 80s and 90s

The systemic approach to the world *problematique*, a word invented by Aurelio Peccei, to highlight the complexity of the challenges, was assessed in parallel by **Robert Ayres** who placed the macro-economic manufacturing model

into a new framework: "**Industrial Metabolism**". He argued that if industry were to survive the challenges it poses, manufacturing needs to behave like a metabolism, producing and consuming like any digestive system in nature does: i.e. transforming from one to the other producing and consuming matter and energy. The approach, which has been documented theoretically on a macro-economic level generated broad academic interest, the business community has remained quite distant from this thought-provoking concept. We met regularly at the United Nations University in Tokyo where we worked on parallel concepts in the mid-90s on a platform provided by Heitor Gurgulino de Souza, its visionary rector for over a decade.

The systems approach, in a theoretical and geo-cultural context was best spelled out by **Fritjof Capra** in his trendsetting book "**The Tao of Physics**" and later complemented by "Turning Point", and recently "The Web of Life". Fritjof Capra set out to share how nature works, how networks operate, how feedback is provided, and how different production system and consumption model we have designed over the past fifty years lack any self-correcting features. Our linear approach is insensitive to any of the changes that naturally occur around us. Fritjof Capra took a theoretical approach, but succeeded quite rapidly in providing a basis for a broad range of initiatives, some managed by himself, some a natural result of the fundamental shift in paradigm that he proposed. His **Ecoliteracy** initiative is probably the most critical of them all, realizing that unless children become literate in ecosystems, there is no future, since so few of the adults are capable of learning how to integrate their thought processes into this new reality.

We have been soul mates for over two decades, our regular walks in the Berkeley foothills, or our residential discussions at my teahouse in Kamakura, Japan where we shared tatamis in preparation for our joint book "Steering Business towards Sustainability". These helped me to process the work of Arne Næss, while I attempted to put his insights into a pragmatic context. This book has the unique honor to be the first ever book presented on broadband internet video on April 5, 1995. Without realizing, we consumed perhaps 50 percent of the internet capacity between the United States and Japan - applying the concept that the medium is the message. Fritjof did me the honor to introduce The Blue Economy to his audience in the Bay Area of San Francisco in April 2010.

All major thinkers made their assessments, undertook studies, published books, but perhaps no one succeeded in building up a broader grassroots movement than **Bill Mollison**, the founder of the **Permaculture** movement. Bill Mollison studied how nature could enhance nature, by using the best of nature and

was inspired how the Native Americans in New Mexico turned dry highland into rock gardens feeding themselves and beyond. His systems are simple, clear, well thought through and most important, there were concrete cases to come, see and learn from in Australia, and soon everywhere in the world. The hands-on experience provided a basis of inspiration, and while Bill Mollison never wrote the books (but one), nor searched media attention. His approach to sustainable agriculture spread around the world like wildfire.

Bill Mollison and I met in Tokyo in the early 1990s and discussed his different approaches and while I noted that Bill was very much influenced by the Three Kingdoms, his attractive pragmatism was shared by several of his early partners. **Jerome Ostenskovi**, co-founder of Permaculture in the United States and operator of the inspiring farm in Basalt, Colorado quickly demonstrated how his highly performing permaculture would take another leap forward in productivity and revenue generation after he deliberately integrated mushrooms and micro-algae in the process. Even though Jerome had never met Lynn Margulis, he saw the value of the cascading of matter, nutrients and energy. I remain in contact with Jerome after our inspiring dialogues in Colorado.

Prof. **George Chan**, one of the early designers of permaculture who worked closely with Bill Morrison at the outset, who inspired me most after our meeting in Beijing in 1994, organized by Prof. Dr. Carl-Göran Hedén, Member of the Royal Academy of Sciences and a true pioneer in the scientific approach to sustainability. Prof. Chan accompanied me for over 15 years. He designed and built the first pilot cases as ZERI projects in Namibia, Colombia, USA and Fiji. Prof. Chan's perseverance, vision and his incredible life experience that he shared so openly as a septuagenarian was all the more impressive when we worked side by side in the freezing cold, the sweltering hot and the scourging drought where ever we had an opportunity to turn our vision into reality. We could demonstrate that we were not only on the right track, but that we outperform the modern farming techniques.

Table 1: Evolution of Sustainability Concepts since the 1950s

Arne Næss	Deep Ecology	1950's
Aurelio Peccei	Limits to Growth	1960's
James Lovelock	Gaia Theory	1970's
Lynn Margulis	5 Kingdoms of Nature	1970's
Fritjof Capra	Tao of Physics	1970's
Bill Mollison	Permaculture	1970's
George Chan	Integrated Farming Systems	1970's

Robert Ayres	Industrial Metabolism	1980's
Michael Braungart and William McDonough	Cradle to Cradle	1990's
C. K. Prahalad	Bottom of the Pyramid	2000
Mathis Wackernagel and William Reed	Ecological Footprint	2000
Gunter Pauli	Zero Emissions	1980's
	The Blue Economy	2010

These personalities set the stage on the basis of which the United Nations Conference on Environment and Development (UNCED) convened in Stockholm in 1972 under the stewardship of **Maurice Strong** who I learned to know much later in life, and remained on the forefront by 1992 in Rio de Janeiro. Of course others can be mentioned, but upon careful analysis, there are no more than 10 who -for me- set the mark from where the next stage of development of sustainability could evolve. After the prominent political attention reserved to Sustainability and Development by Olaf Palme and Indira Ghandi, the two only heads of state at the first conference, more initiatives were taken to bring the environment to the forefront. UNEP (**United Nations Environment Programme**) was founded with headquarters in Nairobi, Kenya, the first UN office with headquarters in a developing country. I had the privilege to be invited (through a backdoor) to the Rio Summit in 1992 and met Ted Turner and Jane Fonda. By then I was about to inaugurate the first ecological factory made out of wood, with the biggest grass roof ever, and that inspired many. The fact that I had successfully set out to compete against P&G, Unilever and Henkel added to my popularity.

The Rio Summit, twenty years after the Stockholm meeting was attended by over 100 heads of state. As a result, in preparation of this major meeting and as follow-up, several initiatives to steer society towards sustainability became institutionalized. The most important one is certainly UNEP's program around "**Cleaner Production**" directed for years by Jacqueline Aloisi de Larderel. There is no doubt that this program to reduce the environmental impact from industry has mobilized more funds and found more support than any other at the government policy and business strategy level. And Jacqueline succeeded in mobilizing industry to join the platform.

Cleaner Production converted itself into a slogan, and in order to assist developing nations in leapfrogging from pollution to less pollution, using available technologies, major efforts were undertaken to make these environmental

technologies available. The business community evolved from the simple idea of producing with less waste, i.e. cleaner, to producing with better efficiency. The name of Cleaner Production evolved to "**Cleantech**" a buzzword that is still popular. While I interacted with UNEP through Moustafa Tolba, its Executive Director who was a great admirer of Aurelio Peccei, the concepts of Cleaner Production and Cleantech seemed to "reduce pollution" whereas it became clear to me that what we do not need "less bad - rather more good". These dialogues and exchanges with UNEP lead to the introduction of an ethical dimension in my work. Whereas the perfect cannot stand in the way of the good and the better, it all came down to an ethical decision: polluting less - is still polluting.

The **Business Council for Sustainable Development** (now the World Business Council for Sustainable Development), initiated by Stephan Schmidheiny and first directed by **Hugh Faulkner**, a politician-turned business manager-launched the concept of **Eco-Efficiency**, before the Rio Summit summarizing the core ideas in the book "Changing Course". The leading business executives argued that overall productivity and efficiency could be improved while at the same time using less raw materials from nature. The concept found a broad appeal in both industrialized and developing nations, especially within the corporate community. Business leaders from around the world gathered around this program and established a major think tank and lobby, known as the World Business Council for Sustainable Development, operating with the blessing and support of the International Chamber of Commerce. Hugh Faulkner enjoyed the cutting edge approach and the uncompromising attitude of "zero emissions and zero waste" which had become my hallmark. He participated in a series of conferences at the early stage of ZERI including our meeting of heads of state in Jakarta. He subsequently became the first Chairman of the Board of the ZERI Foundation (1996) and lent more than support, but he also guided me often through the difficult process of being a pioneer.

The conceptual framework which supported **Eco-Efficiency** was well spelled out by the **Wuppertal Institute**, and **Ernst Ulrich von Weizsäcker**, founding president of the Institute. His book, "Factor 4" was written in collaboration with Amory Lovins (co-founder and chair of The Rocky Mountain Institute), an expert on renewable energy and environment. **Bio Schmidt-Bleek**, one of von Weizsäcker's colleagues at the Institute, found that the number 4 was not enough, and insisted on Factor 10, arguing successfully with policy makers to set clear targets. Both Ernst Ulrich and Bio rightfully submitted that business will generate substantially more value through the integration of services, and dematerializing products, thus securing a growth in the economy (fourfold or

tenfold) without needing a tenfold increase of energy and matter. The logic found a broad political support in Europe.

The disappointing observation of this reduced material and energy need is the rebound effect. Even though material and energy content of one product decreases, total consumption increases by multiple factors, thus continuing the devastation of the ecosystem. The authors subsequently started worrying about the impact of growth. Ernst Ulrich von Weizsäcker went on to become a Senator and a respected policy maker and Bio continued to propagate his approach. I had the privilege of first learning to know Ernst when I was publishing the State of the World and organized the visit of Lester Brown throughout Europe in the late 80's. Later we became closer friends, and he even joined my 50th birthday anniversary. As members of the Club of Rome, and a prolific authors, I have benefitted from his support and advise over the past 20 years.

Table 2: Institutions and Sustainability Concepts since 1980s

UNEP	Jacqueline Aloisi de Larderel	Cleaner Production
WBSD	Stephan Schmidheiny Hugh Faulkner	Eco-Efficiency
Wuppertal Institute	Ernst U. von Weizsäcker Bio Schmidt-Bleek	Factor 4/10
TNS	Karl-Henrik Robert	System Conditions
NCI	Paul Hawken and Amory Lovins Janine Benyus	Natural Capitalism Biomimetics
ITT/NAE	Robert Frosch	Industrial Ecology
ISO		ISO 14,000
IFOAM		Organic Standards
Development Alternatives	Ashok Kosla	
Las Gaviotas	Paolo Lugari	Systems Implementation
ZERI Foundation	Gunter Pauli	Beyond Sustainability

Business and society are in need of some clear (yet simple) basic rules by which both should abide. The continued deterioration of the environment motivated a group of scientists to formulate **Four System Conditions**, which were summarized by **Karl-Henrik Robert**. Whereas Cleaner Production argued for less pollution, The Natural Step provided the conditions and the rules under which this could be achieved. The Natural Step makes abstraction from any economic value, focusing the extraction and the production of minerals and materials. Business is inspired by these guidelines which provide a solid basis and several local governments attempted to adopt this framework for local policy making. The

demand for more than a clear methodology, and a pragmatic approach in order to implement sustainability became apparent when companies whose staff had been broadly trained continued to disperse increasing amounts of metals in the environment. Whereas the concepts and the system conditions could be recited by heart, translation into a pragmatic corporate strategy seemed a major challenge. Karl-Henrik Robert and I first met when I was heading Ecover, and he generously quoted my company as one of the pioneers applying the four systems conditions. So I wondered, how can I be a pioneer and receive the honors and references from a thought leader like Dr. Robert, when I am unwittingly and unknowingly destroying the rainforest?

Paul Hawken and Amory Lovins, reformulated the comprehensive framework of Factor 4 after an extensive research under the title **Natural Capitalism**, based at the Natural Capitalism Institute in California. The need to include nature as a part of the economic system, searching for productivity of capital, labor and raw materials have been the subject for debate for a long time. However, Paul's eloquence and Amory's scientific rigor brought the same basic concepts of Factor 4 in a format that inspired business, with one addition: biomimetics. **Biomimetics**, a research program that searches for inspiration to industrial processes and consumer product design originated at the University of Reading back in 1950s, that was later complemented with investigations labelled as Bionics in the 1970s in Germany by a network of research institutes there, was in the late 90s popularized by Janine Benyus under the name Biomimicry.

Paul was also a founder of The Natural Step in the United States and thus one finds the inspiration in the design of a production and consumption model, which includes, and even, thrives on nature. Therefore the success of the concept of Natural Capitalism was based on the preparatory groundwork of Ernst-Ulrich von Weizsäcker, Karl-Henrik Robert and **the Industrial Ecology** movement, around **Robert Frosch**, first at the United States National Academy of Engineering Sciences, then Senior Fellow at the Kennedy School of Government at Harvard University in Cambridge, Massachusetts.

My first interactions with Paul Hawken date back from the early 90s, and we reconnected fifteen years later. Janine Benyus participated in ZERI events and her books were actively promoted (and translated) by my team in Japan. As time evolved, we facilitated a broader platform for biomimetics in Europe, and connected with all the leading scientists like Andrew Parker, Curt Hallberg and Fritz Vollrath. The ideas biomimetics stand for have a broad appeal, especially when radiating beauty as Janine's presentation always do, only to realize that we

are all fascinated by these inspirational cases from nature, but that business continues to think in a core business - core competence mode. Thus we realized that companies solely borrow an innovation for the design of a new product or a creative process, while the system continued to have devastating unintended consequences. Observing how under one hand product design celebrated "the recipe" from Nature, on the other hand continued to be as excessive in the consumption of toxic chemistry in the manufacturing process, or the incapacity to cascade all matter and energy as an ecosystem would do. I went back to the roots and concluded that sustainability must be based on a systems approach where we integrate products, process and systems into a new business model. Otherwise, what is now an unintended consequence could well evolve into collateral damage.

It was **Dr. Ashok Khosla**, the founder of Development Alternatives, based in India who demonstrated his mastery of all the concepts outlined above, and put it to the service of the people in the developing world. Whereas too many American green pioneers seem to measure success by the money made and grants their organizations receive, Ashok measures his success by the millions of jobs his organization creates, offering the much needed social and human dimension of sustainability. Ashok also takes the ethical component to prominent levels and differentiates from the world of micro-credits, evolving towards a strong entrepreneurial environment dominated by micro-investments. Investments confirm our confidence in the entrepreneurs, debt at high interest rates guaranteed by 5 other colleagues demonstrates our lack of confidence.

The exchanges with Ashok that started already in 1992 at the Rio Summit where he spearheaded the NGO meetings with remarkable success, have solidly shaped my insights on ecosystem services. Our years of close cooperation made the social dimension an integral component of all initiatives that I stand for, much along the lines that Aurelio Peccei had taught me. We have worked intensively together, much complemented by the vision and far sight of the Rt Hon Anders Wijkman who is one of the most vigorous proponents of policies to reverse the climate change dilemma. Today, both represent the cornerstones of the ZERI Foundation.

It is Ashok who made it clear already that poverty could be eliminated by generation more value with what is locally available, a decade before the successful book "Bottom of the Pyramid" by C.K. Prahalad described how poverty could be eliminated by making profits. Actually Ashok focuses less on the profit motive and directs his efforts to stimulate entrepreneurship. Anders Wijkman had done a lot of the pioneering work that created the groundwork for the Ecological

Footprint, which William Rees and Mathias Wackernagel to effectively articulated into a tool that is easy to understand and simple to use.

Business looks for an independent certification of its environmental management practices. **The ISO 14,000** turned out to be the key certification for corporations wishing to demonstrate their environmental performance. The problem remains that even a nuclear waste processing plant can obtain certification. ISO 14,000 certifies that a plant “environmentally managed” as long as dioxin is discharged according to the law, and a program is in place to reduce it. I had the audacity to present to ISO headquarters in Geneva, Switzerland the concept of an ISO 21,000 back in 1996 setting the standards at the level of zero contamination and zero waste. It never took off. But over the years it became obvious that industry does welcome and is ready to pay for an outside audit to confirm its sustainable practice even beyond ISO 14,000. At the turn of the century the social dimension became a key new addition. The term Corporate Social Responsibility (CSR) emerged and then ISO 26,000 was agreed as a clear framework confirming the opportunities that Ashok had pioneered successfully - only he did not call it CSR.

In addition to these international standards, many nations started to develop and institute green labels. **Anders Wijkman** was one of the pioneers when the Nature Conservancy he headed in Sweden successfully swung consumers towards ecological products thanks to the label it provided back in the late 80's. The scenery at the European level was more complex. Even though two detergents could differ as much as 1,000 times in biodegradability, both could obtain the green label. When the green label was agreed for washing machines, then 50% of all models on the market immediately qualified. It certainly has not become an instrument to motivate business to innovate; rather it has been a tool to institute inertia. The European Union, eager to move from a product label to process certification agreed to an Eco-Management and Audit Scheme (**EMAS**). Companies submitting themselves to this rigor would automatically produce in an environmentally sound manner. But how far would the definition of eco-management go?

Agriculture also looked for an internationally recognized certificate like the one delivered by **IFOAM**, the international organic farming organization. The European food crisis in the 90's served as a wake-up call. Animals were fed their sisters' bones as a part of a recycling program that was able to boost productivity, while endangering human health. But there is more than the negative, there are also the lost opportunities. Even when coffee is grown organically and traded in a fair

way, the consumption model of drinking coffee remains wasteful since only 0.2% finally ends up in the cup, and 99.8% is wasted. The issue is not “that this coffee is free of pesticides and synthetic fertilizers”, but rather that the farming responds to the needs of the people. A fair income for the farmers and healthy products at a competitive price for the consumers must be considered in the first place. Whereas the green, organic and fair trade label has become a commonplace - time has come to go beyond what has been done so well with so much effort. The ZERI Foundation went forward and proposed the Chido's Blend, a coffee where all the waste on the farm, and at the point of consumption is used to create food - putting the cascading amongst kingdoms in practice. Coffee -a plant- feeds mushrooms -a fungus- leaving behind a substrate enriched in amino acids, an ideal feed for animals.

At this point in the late nineties, environment and ecology are embedded in the jargon, and the strategy of societies and business. The question is "how much is just greenwashing - and how much is a fundamental shift towards sustainability?" The **local agenda 21** motivated thousands of cities and communities to take their vision of environmental development in their hands and outlined strategies which are an inspiration especially in the developing world. The key question remained though, is this all enough to reverse the negative trends we continued to read in **Lester Brown's** authoritative annual reports "**State of the World**" and "**Vital Signs**" and his team now headed by Christopher Flavin? It clearly is not. I was the publisher of several language editions of these reports and was fascinated by the plethora of data, and the convincing arguments presented by Lester. We worked for years together and he did me the great honor to come and inaugurate the ecological factory I had built in Belgium. For me, it was high time to go beyond the theory.

Within a few weeks after CNN Prime Time News aired its report on the ecological factory that I constructed in Belgium, **William McDonough** and **Michael Braungart** dropped by to have a look. They stayed and we discussed until the early morning hours about the concept that we ended up labeling "**cradle to cradle**". This term became 15 years later a title of their successful book and is now widely referred to as **C2C**. It sounded so right that evening. Then I realized again that Lynn Margulis had offered this wisdom "waste of one is food for another belonging to another kingdom". No animal eats its own waste - with a few exceptions of course. Actually, the widely debated mad cow disease demonstrated that species degenerate when forced to deal with their own waste. Industry has all too often been forced into recycling, making bottles out of bottles, thus making glass bottles more expensive, or making paper of less quality at a higher price. Here is where the concept of upcycling or upsizing emerged, so that glass, blended

with CO₂, produces a foam, that competes with concrete, insulation, paint, fire retardants and so much more, generating more income and serving many functions. Then I wondered the options we have to tackle the ever growing demand for metals and mining. Do we want to make batteries out of batteries, or replace dirty batteries with less dirty longer life batteries - or would we not better opt for an energy system where batteries are no longer needed? I clearly decided in favor of the most difficult one - eliminate the concept of accumulators of energy.

Inspired by the Best Practitioners

With such a world of theory and concepts, more people started looking for the leading practitioners: inspiring people in the field who make it happen. **Paolo Lugari**, director of the environmental research center **Las Gaviotas**, located in Colombia, who developed the broad initiative in renewable energies, reforestation, self-sufficient hospital and housing, biodiesel generation, and the provision of drinking water, has applied systems thinking in a more efficient manner than ever considered feasible before. Paolo unleashes creativity and succeeds in managing crisis as a way to innovate. Thanks to Mario Calderon Rivera, a friend for life and a former banker, I learned to know Paolo back in 1984 and had the pleasure to accompany him in many of his ventures, sometime simply translating his poetic treatises, sometimes serving as a sparring partner in debates, sometimes getting hands dirty contributing to the pioneering exercises on the ground in the Orinoco Basin of Latin America.

The social dimension is often debated but it took me a trip to Zimbabwe to connect with **Wendy Luhabe** in 1994. She had co-founded WIPHOLD, the women investment group in South Africa that is today quoted on the Johannesburg Stock Exchange. Wendy and her team put the money of ordinary women to where they considered it important to act for them. **Hazel Hendersen**, who I first met in 1979 in Salzburg at the Club of Rome meeting on "No Limits to Learning" demonstrated the power of ethical markets, which is not yet mainstream, but which is increasingly listened to. **Wangari Maathai**, who came to spend a few hours at the ZERI Pavilion in Hannover helped me look at reality in a clear way, planting one tree at the time, can make a difference in the livelihoods of villagers. **Stan Shih** and I met first in 1983. He went on to create his ACER Group of companies complemented the commitment to a new competitive model that also I found with **Yvon Chouinard**, the founder of Patagonia whose underwear I offered back in 1992 to all my employees at Ecover, saving energy while having quality, with a clear commitment to sustainability.

Amongst the leaders in action, I must mention my brother in sustainable

development, **Edward Ayensu** who as a leading biologist from Africa was director and senior scientist at the Smithsonian Institution in charge of biological conservation and the senior author of the first nationwide publication on the Endangered and Threatened Plants of the United States. His worldwide experience in sustainable development is reflected in his numerous publications. He demonstrated to me how to bridge science, policies and finance when I met him at the World Bank when he was the Chairman of the Inspection Panel. His deep commitment to his home country Ghana and the African continent clearly demonstrated that even though he could have lived comfortably in London or Washington DC, he knows that he can contribute his best to the development process in Africa. This commitment is also demonstrated by Chido Govero, the young Zimbabwean lady who has only one goal, that is to create a community with food security where jobs are abundant so that girls like herself are not abused and are not subjected to needless spreading of HIV/AIDS.

Against this background and with this wealth of friends and pioneers that are not explicitly mentioned, I had the privilege to start in 1994 a research initiative that is at the same time uncompromising, and self-evident. This model is uncompromising since it states clearly that there should be "no waste", everything is to be reused by generating additional value. It is self-evident since the only species on Earth capable to make something no one else desires is the human species. We argue from an ethical perspective that no one is permitted to steal less - you cannot steal; no one can pollute less, you cannot pollute and damage your environment.

Learning from Deep Ecology, that humankind is part of nature, "no waste can be wasted", and whatever is waste for one is food for the other belonging to another kingdom. **ZERI** (Zero Emissions Research and Initiatives) created a long series of concrete initiatives around the world by demonstrating that it is possible to target zero. ZERI proposes an economic development that emulates natural systems as opposed to recipes from one species. We cluster industrial activities, cascading flows of material and energy, in order to dramatically increase humanity's capacity to respond to the basic needs of all. I wish to maintain a fast track implementation strategy based on the simple scientific methodology of trial and error, which permits a learning experience, correcting mistakes en route, while stimulating research, and to develop more theory in order to succeed what all wish: a better future for all children on Earth, and for Earth itself as well.

ZERI has a clear target (zero), and is based on a 5-step methodology, which I tested in 50 odd projects on all continents. The incredible work of dozens of

pioneers who became partners in action is complemented with an innovative communication strategy. The goal is not to convince the Huffington Post to report, or get onto the wire services of Bloomberg, if that happens then it does without undertaking a deliberate effort. I am committed to reach out to the next generation through fables. Whereas scientists have the moral obligation to question hypothesis, fables have the liberty to navigate in a world of fantasy, where all is reality. But, fables and fantastic stories provide the inspiration for the creation of new hypotheses and as such new science ... that can become vision and then evolve to a better reality than the one we know today.

The core objective of my work is to go beyond sustainability. If we only teach our children everything we know, then they can only do as bad as we have performed. The next generation has to go beyond the obvious and ask questions like "What is the most abundant and least used source of energy on Earth?" And whereas we spontaneously would respond solar - we have to admit that the sun only shines on half the Earth for half the day - and gravity functions all the time everywhere. This does not mean that the pioneers of green energy are on the wrong track, this only implies that we have to focus on how we can do much better with what is already available.

If one observes the 5 Kingdoms of Nature, how they relate to each other, nature's crust and the atmosphere, it is possible to imagine not only a society and a world where one can meet the needs of all, one can even imagine Earth on a continued path of evolution. Since we desire to have more impact, we embarked on a process to identify the innovations that would change the business model, permitting that the best for the world and the healthiest for us would be the cheapest. Again inspired by Natural Systems, we would only use what is locally available, and submit ourselves to the deep principles imposed by the laws of physics which determine the framework where the networks of the networks of life thrive. Actually, it is our goal to go with the flow, unleashing entrepreneurship inspired by the bounty of opportunities and refrain from trying to create the wave.

We all have been working hard on the creation of the green economy and continue to endorse the concept. However, we like to go beyond what we imagined 30 years ago and embark on a vision that goes beyond even the best we had in mind then. One can call this fresh look at reality Green 2.0, or embrace it as The Blue Economy, remembering that the sky is blue, the ocean is blue and the Gaia seen from the universe is as blue as can be. We suggest that we search for more impact - much more indeed, and faster!

Gunter Pauli (1956) graduated from INSEAD, Fontainebleau in 1982 and prior to his dedication to ZERI, he undertook numerous initiatives in business, the media and culture. In 1992 Gunter was instrumental in the building of the first ecological factory for detergents. He has written 17 books published in 21 languages. His first children's book "How can I be the strongest tree in the whole forest?" has been translated in over 100 languages. He is the author of The Blue Economy and is committed to unleash entrepreneurship by exposing the next generation to the incredible opportunities before us.

Watch a 3 minutes video on
The Blue Economy
<http://www.youtube.com/watch?v=1af08PSlals>

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