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Dear Reader,

Last month's issue presented a list of terms related to sustainability, in my first attempt to bring some clarity to those of you reading new buzzwords or listening to them in conversations and conferences. Sustainability is indeed a new topic for our culture, so we felt it important to be armed with the new vocabulary. We are sharing with you in this issue reflections and perspectives about the Biosphere and its connections with business.

Enjoy the reading!

Isabel Rimanoczy  
Editor

#### Quote of the Month

*"Like a child in a womb, all we know exists inside this outer body – the planet. And all is dependent on it."*

Susan Griffin  
Eco-Feminist Author  
(1943 - )



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## Biosphere and Business

By Isabel Rimanoczy

Biosphere can be defined as the sum of all ecosystems of the planet, and the term was coined by geologist Eduard Suess in 1875 who used it to describe "the place on Earth's surface where life dwells."

We know now that every part of the planet, from the polar ice caps to the Equator, supports life of some kind. And the astonishing places where life is sustained have caused us to pause in establishing the actual thickness of the biosphere on earth. For instance the Rüppell's vulture has been found at altitudes of 37,070 feet (11,300 meters) while fish can be found at a depth of 27,460 feet (8,372 meters) in the Puerto Rico Trench.

The biosphere is a self-regulating system, integrating all living beings and their relationships, including their interaction with the elements of the lithosphere. The lithosphere<sup>[1]</sup> itself is a 30-320 miles (50-500 kilometers) thick rocky layer covering the entire surface of the planet, composed of the crust and the hard uppermost mantle, which is fragmented into tectonic plates which, as we well know, react to stresses. The biosphere also interacts with the hydrosphere, defined as the combined mass of water found on, under, and over the surface of the planet, and with the atmosphere, which is the layer of gases surrounding the planet Earth. These gases protect life on Earth by absorbing ultraviolet solar radiation, warming the surface through heat retention (greenhouse effect), and reducing temperature extremes between day and night.

And it gets even more complicated if we consider microscopic organisms. Microbes have been found in the Earth's upper atmosphere at a height of 25 miles (41 kilometers)<sup>[2]</sup>; marine microbes have been found at depths greater than 6 miles deep (10 kilometers) in the Marianas Trench<sup>[3]</sup>, and microbes have been extracted from cores drilled more than 3 miles (5 kilometers) into the Earth's crust in Sweden<sup>[4]</sup>.

### **Gaia, the Earth Goddess**

The concept that the biosphere is itself a living organism is known as the Gaia hypothesis, after the Greek goddess of the Earth. British atmospheric scientist James Lovelock proposed the Gaia hypothesis to explain how all factors interact in the biosphere. For example, when carbon dioxide levels increase in the atmosphere, plants grow more quickly. As their growth continues, they remove more and more carbon dioxide from the atmosphere. Further, soil and oceans absorb carbon dioxide, too. When carbon dioxide increases faster than the rate of its absorption, it creates the acidification of oceans, which in turn alters marine life. The absorption rate saturates, elevating the CO<sub>2</sub> level in the atmosphere. The higher CO<sub>2</sub> level in the atmosphere contributes to the creation of a greenhouse effect, which raises the earth temperature. Increases in the earth's temperature have a direct impact on weather patterns.

Cause and effect connections and interactions are not always linear, and they often have unforeseen impact. For example, the alteration of marine life directly impacts the coastal communities and fisheries. Fishermen living in small coastal communities are thus forced to seek alternate subsistence, and many migrate to urban centers. There, housing costs and high unemployment can create depressed local communities, even shantytowns of urban poor. Loss of income leads not only to loss of dignity but of family and community ties. Results include people becoming stressed, developing mental or physical illness, and experiencing despair which can in turn lead to substance abuse and crime. From a different angle, diminished marine yields push commercial fisheries to send their crews to spend longer periods at sea in the hope of maintaining their production numbers, generating overfishing and the depletion or extinction of some species.

## **The Industrial Revolution**

Things were not always like this. In the latter part of the 18th century in Great Britain, there began a transition from manual labor and a draft-animal-based economy towards machine-based manufacturing. It started with the mechanization of the textile industries, the development of iron-making techniques and the increased use of refined coal. Trade expansion was enabled by the introduction of canals, improved roads and railways.

The introduction of steam power fuelled primarily by coal, the wider utilization of water wheels and water-powered machinery underpinned the dramatic increases in production capacity. The development of all-metal machine tools in the first two decades of the 19th century facilitated the manufacture of more production machines for manufacturing in other industries. The effects spread throughout Western Europe and North America during the 19th century, eventually affecting most of the world, a process that continues with the industrialization of many countries especially in Asia and Latin America. The impact of this change on society was enormous.<sup>[5]</sup>

Ever since the Industrial Revolution, the pace at which we have been exploiting Nature has intensified, particularly through the extraction of the earth's natural resources. Calling what the earth provides "resources" may be an indication of our collectively accepted paradigm: whatever is there, it is there for humans to extract, use, and enjoy. Whether through mining, industrial agriculture, forestry, commercial fishing or urban developments taking over former natural landscapes, we have almost three hundred years of a "take-make-waste" culture. As Elkington and Litovsky indicate in their article "The Biosphere Economy"<sup>[6]</sup>, since the Industrial Revolution the natural world has been equally undervalued, by economists, accountants, engineers and politicians. Defenders of wildlife were dismissingly called "tree-huggers" who stand in the way of real business and profit.

## **Inertia is not an option**

Something has begun to change. The impact on the global economy of recent severe weather-related activities have caused us to become aware of how things are connected. Economists and accountants are paying attention to increasing resource constraints, and so are engineers, scientists, business leaders, activists and eventually, also politicians. In 2010 the United Nations Environment Program sponsored research on the economics of ecosystems and biodiversity, conducted by Pavan Skhdev, former Managing Director of the Markets Division of Deutsche Bank. The focus of the initiative is the creation of what Elkington and Litovsky call the "biosphere economy", a new paradigm of doing business by working with nature, instead of against it.

The study concludes that the degradation of the earth's ecosystems and biodiversity due to deforestation alone costs us natural capital worth somewhere between \$1.9 and \$4.5 trillion every year. Tropical rainforests for example act as freshwater pumps for the planet. The Amazon generates and pumps into the atmosphere some 8 trillion tons of water a year, feeding into an aerial belt of water vapor that connects tropical forests across the globe. When we cut down the Amazon forest, rainfall decreases from South America to Tibet, and it has great impact on Brazil itself, where the country's energy supplies is 70 percent dependent on hydropower.

So responsible behavior by the human race seems to go beyond romantic "tree huggers". Or is it a strategic issue for companies whose operations make up the \$1 trillion agricultural industry in southern Brazil and Argentina? Or is it about the livelihood of communities, unemployment, and

lack of access to safe and fresh water?

As the authors indicate, our species has come up against natural boundaries at different points in its history, with entire civilizations sometimes collapsing in the process: the Roman Empire, Easter Island, and the Mayan civilization to name a few. But this is the first time in our evolutionary progression that some of the limits we face are planetary in scale. Those that are not, have planetary implications, and most of them we can only guess or imagine at this point. The solutions must be developed and deployed at the same scale, Elkington and Litovsky suggest.

The financial value at stake is hard to overstate. Losing natural resources hits us most directly through the loss of key 'services' the planet has been providing to us, and we have taken for granted: humidity and temperature control, provision of fresh water, pollination of crops, moderate weather patterns. Pollution, deforestation and resource degradation can no longer be considered externalities, neither can the ecosystem services taken for granted. "We are going to see a profound shift from dealing with environmental issues as risk management challenges, to developing new business opportunities by acknowledging a company's dependency on ecosystems".

The authors invite to step into the urgently required paradigm change. If numbers are what you follow, they invite us to think of a 2008 study that reports how the 3000 biggest public companies of the world have ecosystem liabilities of \$2.2 trillion, representing an average of 30 percent of their combined profits.

If you can see the wider picture, though, think of us all living on a spaceship called Earth. We will have to solve this problem we have onboard. The good news for me is that it took the biosphere an estimated 3.5 billion years to evolve. And it took us barely the last 70 years to put it (and us on it) on the brink of collapse. So let's start undoing the mess. As rapidly as we can.



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[1] Wilson, M. (2000) Igneous Petrogenesis - A Global Tectonic Approach, Chapman and Hall, London.

[2] Wainwright et al., 2003, in FEMS Microbiology Letters

[3] Takamia et al., 1997, in FEMS Microbiology Letters

[4] Gold, 1992, and Szewzyk, 1994, both in PNAS

[5] Source: Wikipedia

[6] John Elkington and Alejandro Litovsky "The Biosphere Economy", in Corporate Responsibility Magazine, Jan-Feb 2011 pp 10-14.

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