



Case 67

Trees in the Desert

This article introduces a creative approach to planting trees in dry zones as one of the 100 innovations that shape "The Blue Economy". This article is part of a broad effort to stimulate entrepreneurship, competitiveness and employment.

The Market

The world value of logged trees has been estimated at \$85 billion. While a lot of wood is removed illegally and escapes all statistics, the value added created by this shadow economy would increase the value to +\$100 billion. If we add pulp, paper, cardboard and related forest products then we reach a turnover in excess of \$200 billion. Each year an estimated 3 to 6 billion trees are removed from primary forests, as opposed to the plantations, with a tree density of 50,000 to 100,000 per square kilometer. The prime uses of this hardly renewable source are wood as a fuel (46 percent), groundwood for paper and pulp (still an amazing 43 percent) and lumber for construction (11 percent) for a total 3.7 billion cubic meters.

Paper at its origin nearly 2,000 years ago in China was a blend of mulberry bark and hemp with scraps of cotton and linen. The US Declaration of Independence was written on hemp. The shift to wood pulp occurred only in 1843 stimulating demand for 300 million tons of paper from wood, of which only 38 percent is recycled, and non-wood fibers like bamboo, kenaf and hemp represent a mere 7 percent. Each US citizen uses 340 kilograms (kg) of paper per year, good for 90 million tons for the entire population. The consumption of paper has increased 400 percent over 40 years. While now most of the trees are logged from plantations, the world's demand for paper requires 4 billion trees annually. One large and mature tree produces an estimated 90,000 pages or 2,700 copies of a 35 page newspaper.

Privately owned forests in the United States supply 91 percent of wood harvested in America. These private owners plant 4 million trees each day, good for 1.5 billion a year. This effort has led to a net 20 percent increase of forest cover in North America over three decades something the Europeans have not succeeded. While these efforts are laudable in temperate zones, rain forests once covered 14 percent of the earth, now they cover less than 6 percent. Worse, vast regions of the world that once were thick forest covers have been converted into deserts. There are few countries that protect their forests like Bhutan does. The new constitution approved in 2008 stipulates that 60 percent of the country must remain forest. At present, forests represent 71 percent and it is increasing.

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The Innovation

The planting of trees has undergone numerous innovations. The importation of non-native species, the selective breeding of hybrid trees, the genetic modification of drought resistant and fast growing varieties have all resulted in tree planting schemes that convert our appetite for wood pulp into a farming system whereby forest land is treated like farm land: a soil to plant, grow and harvest. Modern tree farms succeed in harvesting large volumes of wood for pulping only 7 years after planting. Las Gaviotas (see Case 6) pioneered the regeneration of forest based on the symbiotic relation between native trees and mycorrhizal fungi that lead to the successful survival of 92 percent of the seedlings in harsh summer conditions. While many of these efforts are showing new ways forward, the greatest challenge is to plant trees where the desert has taken over.

Pieter Hoff inherited a lily and tulip export business in the Netherlands that was started by his grandfather in 1923. Pieter had always been fascinated by how trees could grow on rocks. All around the world one can observe 50 meter trees standing stable and looking healthy on rocks without any form of support, while a commercial plantation a few miles away would rely on irrigation and fertilizers to survive. He realized that when we plant trees, we either dig a hole or we cut a wedge in the soil, we destroy the capillary water transport system of the soil. Worse, when we plant a tree, it already has developed secondary roots which are incapable of penetrating hard, dry, rock-like soil. Nature approaches this differently, without using brute force it simply places seeds on top of the soil, often carried there and covered by excrement of birds. This keeps the capillary water drainage intact, plus supplies the tree with the right mix of nutrients to get started under harsh conditions.

Pieter went on to design a bucket with two holes. It could not be kept more simple. One hole catches rainwater, produces and captures condensation water inside the box, and the other hole in the center is to sow a seed or to plant a seedling. Once a little bit of water is trapped in the box, it keeps the temperature low creating a cool micro-climate. A wick drips in 50 centiliters (cc) of water each day, not enough to grow properly and not enough to die. This challenges the plant to develop taproots and find water itself. After testing the process for three years in the Sahara Desert, Pieter decided to sell his family business and went on to create the company AquaPro which promotes the Groasis Waterboxx. His planting system is based on a box that can be reused ten times permitting the planting of 10 trees. It is called the Waterboxx. Pieter went on to win the Popular Science magazine's innovation award in 2010.

The First Cash Flow

The approach to planting is limited to break the hard soil, creating a small hole of 10 centimeter deep, plants the seed and put the waterboxx on top of it. If one year later the roots are deep enough, then one simply lifts the box and reuses it elsewhere. The popular interest in his invention and the simplicity of its application permitted Pieter to start a Netherlands-based online internet sales company (AquaPro), from where one can order

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containers of waterboxxes. This open source approach, which requires no previous expertise or training, has now been proven in 30 projects located in France, Spain, Morocco, USA (California), Kenya, Mongolia and Oman. The average survival rate of the newly planted trees with the waterboxx is 88 percent in climatological conditions that would normally see only 10 percent success. This provides solid references to network with partners in large scale operations.

The Opportunity

Pieter approaches the tree planting, the fight against erosion and the reversal of desertification not only as a service to society and the environment, he sees this as an opportunity to stimulate entrepreneurship providing a transparent business model based on a proven concept. He offers would-be businessmen a simple mathematical model with a series of basic assumptions outlining all options for planting trees for food, fodder, pulp or biofuel. The use of transparent accounting, rendering these opportunities within reach of everyone with reasonable returns starting from land that is of no value makes this a competitive proposal for investment where the initial requirements are labor and the desire to succeed, instead of large lay-out of capital. This permits not only the generation of a stable income, when the deserted land turns green, and starts supporting the communities then it builds up social capital. The trigger for success is the entrepreneurs who has the skills to make it happen and the capacity to assess the risks. This is one of the core characteristics of The Blue Economy.

GUNTER PAULI

Further information on the 100 innovations at www.blueeconomy.de.

Order Gunter Paulis book at www.blueeconomy.de:

Zen and the Art of Blue

Publication and dissemination of this article, including translations, require prior written consent.

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