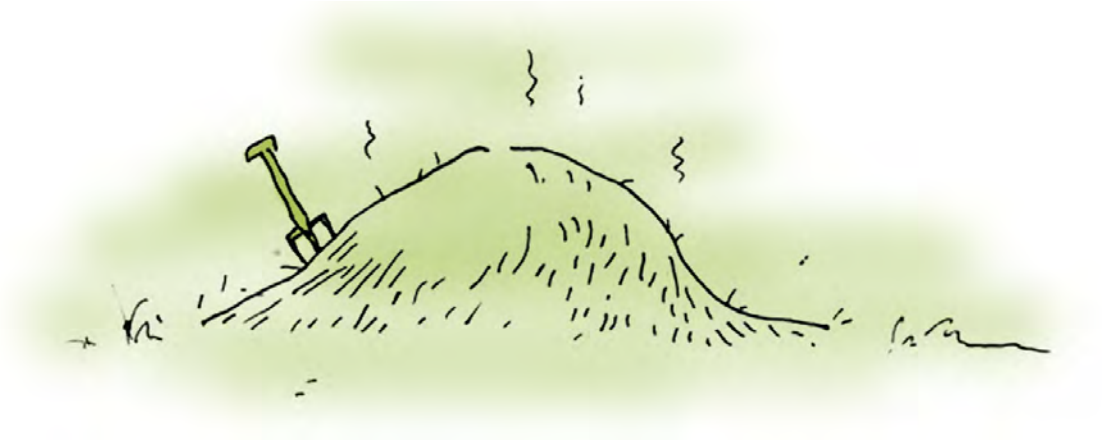

COMPOSTING, RECYCLING, CONSUMING ECOLOGICALLY

A basic principle of sustainable life in ecovillages is the efficient recycling of nutrients and all materials. All organic biomass and biowaste can be decomposed in a composting process to be used in soil improvement and plant production, which improves nutrient recycling and creates high quality soils.

With careful sorting, valuable raw materials such as metals, glass and paper can be recycled again and again. Sometimes it is more ecological to reuse items instead of recycling the materials. Clothes, dishes, books and other things can find their new owners at flea markets and at exchange events. High-quality products have a long life.

Consuming ecologically means consuming less, treating things well, repairing, fixing and remaking. It also means paying attention to the origin of the raw materials, as well as to the production conditions and methods. Environmentally friendly and organic products can be found in most shops. But not everything needs to be bought from shops; we can learn a lot from our local traditions and make a lot ourselves!

HEALTHY SOIL RESTORATION

ZEGG Ecovillage, Germany

"The best thing that humans can do is build topsoil."

Healthy Soil = Healthy Plants = Healthy Food = Healthy People

The first 30 cm of soil are vitally important for the development and sustainment of life on Earth. This level, the humus-rich top layer, feeds plants, animals and humans with all the necessary nutrients. Since the beginning of industrial agriculture, however, we have witnessed an alarming loss of this vital topsoil. Worldwide, 24 billion tons of fertile soil annually are washed or blown away, or are simply destroyed. This is why the key to sustainability is to begin with soil restoration. It sounds so simple yet can be quite profound: Ultimately, soil is our only source for healthy food/nutrition. In addition to air and water, it is one of the essential environmental

Author in front of municipal leaf pile with finished humus in his hand.
Photo by Ina Meyer-Stoll

systems which together make up the basis of life for humans, the flora and the fauna. Only healthy soils are capable of sustaining biodiversity, holding genetic and natural resources, and storing water and energy. Healthy soils also have active microbial life forms capable of breaking down and utilizing many pollutants.

Members of soil biota are the managers, or underground stewards of the Earth. Worms, in particular, break down organic material into smaller pieces that can be digested by microbial beings such as bacteria and fungi. These in turn further digest the organic matter in order that minerals can be more easily assimilated by plants. The amount of soil organisms is unimaginably large. On average, one gram of healthy soil contains approximately 600 million bacteria, 400,000 fungi and 100,000 algae. On one hectare of soil this amounts to more than 20,000 kg of microorganisms within the upper 15 cm. In addition there are 4500 kg of higher organisms at work in and on the soil.

Leaf mulch being applied on ZEGG orchard.
Photo by Achim Ecker.

Decomposition by micro-organisms within the soil is the reverse of the process represented by plant growth above the soil. Recent studies show that the conviction that plants live on nitrogen salts, as industrial agriculture claims, is wrong. Even though plants are able to survive on salts (as offered by chemical fertilizers), they only do this when there is no living humus layer. They seem to prefer to absorb whole macro-molecules and cells from the soil's living matter, such as bacteria. So what they really need is a soil with a high content of living matter to choose from. Growing plants use the energy of the sun to synthesize carbon, nitrogen and all other elements into complex compounds. The energy stored in these compounds is then used more or less completely by the microorganisms whose activity within the soil makes nutrients available for a new generation of plants. Organic matter thus feeds the "life of the soil".

Soil restoration

Coming from these considerations, the protection and improvement of the soil layer are key concerns of the ecological work done at ZEGG. Situated in the German state of Brandenburg with its deep post-glacial sands, the site's soil is well aerated but water quickly drains right through, taking precious nutrients with it. In the surrounding forests, the average humus layer is no more than 2 cm deep and on open terrain a thin grassy sod covers pure sand. Rainfall is also very low, amounting to only 550 mm per year; this is further exacerbated by the soil's poor capacity to store water.

Author probing soil after years of mulching and adding green manure to sand.
Photo by Ina Meyer-Stoll.

Our two main strategies of soil quality restoration at ZEGG are: improving organic matter content; and re-establishment of soil dwelling populations (microbes, fungi, worms, insects, etc.) by creating good conditions for them. We have steadily increased the humus layer by mulching with old straw, leaves and hay from the parks and public gardens of the

Belzig municipality, and with cardboard. Mulching creates a habitat for a multitude of organisms and fungi, which make nutrients available to other plants.

Fresh organic matter is characterized as a rule by a large amount of carbon in relation to nitrogen. In building up the organic content of the soil itself, it will often be desirable to use legumes and grasses rather than simply to add organic matter, such as straw and compost, directly. Legumes draw nitrogen from the air and deposit it in the soil when they decompose.

We also add clay to the soil so a healthy clay-humus complex can be build. This increases the capacity to store nutrients and water.

ZEGG gardener in organic vegetable garden. Photo by Achim Ecker.

"Shit makes flowers grow!" Together with urine, faeces contain high amounts of nitrogen and phosphate. There is a growing phosphate crisis in the world. With known resources receding it seems mad to flush away what we have with valuable water and destroy the nutrients we otherwise need. Instead we can use it, directly fermented with charcoal and micro-organisms. Urine itself is nearly sterile.

We started experimenting with making Terra Preta, the black fertile soil first found in the Amazon basin and later also in Iran, Iraq, Scandinavia and other regions of the world. It is fertile due to its unique composition: about 10-15% charcoal, organic material, ground minerals, microorganisms, fungi and faeces. First, ground biochar is charged with lactic acid bacteria and urine for some weeks and then mixed with the other materials to be laid out in a shallow heap on the ground. This is then digested by earthworms to become black soil.

Terra Preta soils preserve and bind moisture, nutrients and carbon in the soil for probably hundreds of years. This is making it the most promising method and tool in efforts to combat global warming by carbon sequestration. Charcoal can be made from organic waste products. At the same time it is the answer to the global destruction of soil humus content and fertility due to industrial agriculture and chemical fertilizers. "Modern" agricultural soils have a humus and living matter content of less than 2% whereas fertile soils contain up to 60% living matter! Promoting small farms, organic agriculture, terra preta and humus agriculture could counter global warming in an effective way, preserve and cleanse water in the humus layer, stop erosion and depletion of soils, create lasting and permanent soil fertility, bind carbon etc.

Another valuable method of soil restoration is the use of green manures. These include peas, beans, lentils, clover, alfalfa (*Medicago sativa*), lupines (*Lupinus polyphyllos*), broom and black locust (*Robinia pseudo-acacia*) – all members of the pea family (*Fabaceae*). Over a period of several years, we have sown a large variety of green manure plants, which now freely propagate themselves.

User experiences at ZEGG

For about 15 years now, our local town of Belzig has been supplying us with profuse amounts of autumn leaves. Before this, they would drive them to the garbage dump about 10 km away and actually had to pay to deposit this "waste." Ever since they have been bringing it to us, which means they have been paying less, driving less, and wasting less energy. We let these leaves sit for a while and then spread them under trees and bushes, or cover and consequently feed entire areas of grassland with the intention of cultivating them with vegetables afterwards.

When neighbours and guests enter ZEGG, they instantly notice many more birds and a much lusher vegetation than just a hundred metres away. Birds thrive on this richly set table

of a healthier food chain. Every year a greater variety of birds come to enjoy this and help us with our gardening. A herbalist discovered more than 80 healing herbs growing wild here. The enriched soil life has given us a "paradise" and has provided natural ground to support a higher diversity of plants, insects, birds and animals – and higher diversity means higher resilience in extreme times. Please remember: The basis of all this is a healthy soil – it is the Mother of health for all that live upon it.

Teaching children at harvest time in ZEGG's organic garden. Photo by Achim Ecker.

Author: Achim Ecker

Further information
· www.zegg.de/zegg-community/ecology.html
· "Sustainability and Ecology at the ZEGG Community" by Achim Ecker

English books:
· Reed, Matthew. (2010). Rebels for the Soil: The Rise of the Global Organic Food and Farming Movement. Earthscan Ltd, London.
· Bates, Albert & Vandana Shiva (2012). The Biochar Solution: Carbon Farming and Climate Change (Sustainable Agriculture). New society publishers.

PRODUCTION OF HUMUS WITH VERMICOMPOST

Nevoecoville Ecovillage, Karelia Republic, Russia

Earthworms for the vermicompost in Finland. Photo by Outi Tuomela.

Making vermicompost, i.e. using a composting bin with earthworms inside, is a natural way of producing 100% environmentally friendly fertilizer and soil-improving humus from cow or horse manure and/or organic bio-waste and food scraps. It can be done indoors and all year. The humus produced is ideal for fertilization of all kinds of plants, even in places with poor or exhausted soil, and is better than manure in that it doesn't give an excess of nitrates, which can happen if manure isn't used at the correct time.

The composting method described here is useful for cold northern countries with poor soils and short summers, where there would otherwise only be a small window of worm activity and hence a slow natural production of humus, since worms are slow at low temperatures. This method of vermicomposting makes it possible to produce humus all year and indoors. It is ideal for individual household use and doesn't necessitate the production of a large quantity of humus for commercial purposes. However, there are ecovillages where the same technique is used for large-scale production; this requires keeping worms in a separate, heated location.

Description of vermicomposting

What is required:
Worms, 2 bins with tray, manure food waste, or other food for the worms, water.

Worms. The family who shared this story uses common earthworms, which can be found in large quantities and dug out around their farm. These worms are better adapted to their specific climatic conditions than the famously super-productive Californian red worms (*Eissenia fetida*),