R

Reduce

Re-use

Recycle

Make your garbage disappear!!

Re-using corrugated cardboard, paper, and milk cartons in Sólheimar

Practical solutions for the Art workshops, Sunna, Ölur, and Sólheimar's residents

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Table of contents

Reusing trash in Sólheimar

I. Idea

Every year around 40 tons of waste material are being carried away from Sólheimar. Not only is this a sadly high number for a sustainable community, but it is also very expensive. Therefore, new ways should be found to decrease the amount of garbage that leaves Sólheimar each year.

In order to have the smallest impact possible on the environment, Sólheimar tries to follow the rule of the three R's when it comes to garbage: Reduce, Recycle, Reuse. Reduce: Produce less garbage e.g. by buying products with less packaging or by cooking only as much as you will eat. Recycle: Return materials that can be re-processed, cleaned and then used again in their original form, e.g. metal, glass or plastics. Reuse: Instead of throwing away things that have fulfilled their initial function, reuse them in a different way, e.g. turn old newspapers into mulch.

In this report, we want to focus on the third component: Reusing garbage. More specifically: reusing the three major components of waste that leaves Sólheimar: corrugated cardboard, paper, and tetra paks.

II. The different waste components

A. Corrugated cardboard

Corrugated cardboard is mostly used as a material for big transporting boxes, like the ones used to bring products to Vala.

1. What is being done in general

Generally, cardboard is recycled instead of reused. They are ripped apart and dissolved in water, then put back together into new sheets of carton that can now be used again.

However, cardboard is also being reused in many ways in- and outside the house: Hobby gardeners include shredded cardboard in their compost pile or feed it to their compost worms. It is also used as mulch to keep the soil around plants moist and to prevent weeds from growing.

Inside the house cardboard boxes are used for storage, but they are also taken apart and turned into new products: home-made paper, paper maché and other art work. During the last few years, many designers have started creating furniture out of corrugated cardboard. The designs have become more and more durable, holding up to 200 kg.
Upon a request from our side, other eco-villages around the world have shared how they reuse cardboard waste: In Fri og Fro (Denmark) as well as in Dancing Rabbit (USA), L.A. Eco-Village (USA), ZEGG (Germany) and Chrystal Waters (Australia), they use it as mulch and as a layer in lasagna gardens (see below); in Sieben Linden (Germany), they use it as packaging material for their own products. In L.A. Eco-Village, they also grow small seedlings in boxes made of carton that can then be placed directly into the soil.

2. Practical suggestions what can be done in Sólheimar

Sólheimar with its various workshops has a number of opportunities to reuse some of its garbage:

a. Art workshop

Some of the corrugated cardboard can surely be used in the Art workshop to make new beautiful things out of this material that would otherwise be thrown away. For this, it is important to make sure that the cardboard in Sólheimar is treated carefully after its initial use to avoid damage or pollution that makes them unfit for reuse. Cardboard boxes that are in bad condition are more difficult to reuse in the Art workshop. Therefore it would be good if Vala didn't simply throw out the old cardboard boxes, but take them apart into sheets of cardboard and then could place them somewhere clean, dry, and orderly. Such a place could for example be the new Recycling workshop (see below).
Cardboard furniture can be very complicated; however, there are simpler designs. The homes people could easily be incorporated in such a project too, cutting out the shapes and even putting them together with the help of a staff person. Some websites like http://foldschool.com/_about/about_start/about_start.html offer free patterns. If this proves to be too difficult, the idea of cutting cardboard apart and putting it back together to create something new can still be used: Boxes for storage and little boxes for selling products from the bakery or the herb workshop could be made and decorated.
Besides these practical products, decorative things could be made: picture frames, ornaments for Easter and Christmas, toys like jigsaw puzzles or cars and castles that consist of cardboard.

b. Sunna/Ölur

Although the Art workshop can use some of the cardboard, this only solves a small part of the problem. To really deal with it, solutions on a bigger scale must be found where more than a few sheets of cardboard can be reused. This is possible by using them for gardening purposes. Another advantage besides the quantity of cardboard that can be used this way is also the quality: even cardboard that is in fairly bad shape, even dirty, can be reused here. Whenever cardboard is used for gardening purposes it is necessary to remove all plastic tape since it will not decompose.

aa. in the compost pile

Cardboard can be used in compost piles. The piles should consist of both nitrogen and carbon containing materials, so as to ensure a balanced and healthy biological process. Materials high in nitrogen are "wet" materials such as food waste (vegetable waste, tea bags, coffee ground,

etc.). “Dry” materials such as leaves and shredded cardboard are high in carbon. The two different groups should be arranged in alternating layers on the compost pile. Every now and then it is good to air the pile using a rake. If the compost pile is so big that it becomes too much work to turn it over by hand, then Sólheimar could consider buying a machine that does so. An example is the CMC ST 200 (produced by Compost Systems GmbH, www.compost-systems.com), which can be attached to the side of a tractor and rakes the soil. However, this would only make sense if the compost has a sufficient size, because if it stays small enough it would be easier and more environmentally friendly (because no gas has to be burned for the tractor) to simply do it by hand.

The cardboard needs to ripped into small pieces (about 3 cm^2) before adding to the compost. If you use a lot of cardboard, it might be necessary to soak it in water for a while before adding it to the pile so that it is easier degradable. A few drops of detergent added to the water that you use for soaking the cardboard make the decomposing process even faster.

While it is generally advised to mix the shredded cardboard with other dry materials such as straw or leaves, it might also be possible to use cardboard as the only source of carbon. As the information provided online is contradictory, it seems best to compare the composting process and the resulting composted soil of compost piles with mixed carbon sources versus those piles with only cardboard.

Besides the plain brown cardboard sheets, cardboard with prints can also be used. Especially black ink is no problem for the soil, but today even colorful inks are made of biodegradable and non-toxic components. However, glossy prints/coated cardboard does take longer to decompose. The Icelandic agency responsible for certifying organic products (TÚN) has confirmed that products grown in soil that contains ink from cardboard used in the composting process can still be certified as organic. Therefore, Sunna could use the compost even for growing organic vegetables and fruits.

bb. in the molting machine

Sólheimar has a compost machine in Ölur (Big Hanna T-60) that can be fed some of the cardboard as absorbent material in addition to saw dust/wood pellets. This is a great solution because the cardboard is reused and at the same time no money has to be spent on wood pellets. Before putting it in the compost machine, the cardboard has to be shredded so that it’s fluffy and the fibers open up and allow it to better absorb the liquid from the vegetable waste. (Regarding the ink that might be on some of the cardboard, please see above.)

cc. as mulch

Corrugated cardboard works very well as mulch. It keeps the earth around the plants moist as it prevents excessive evaporation and prevents weeds from sprouting around them. The cardboard can either be shredded, or used as it is in big sheets. The cardboard should be placed around the plants or you can simply place it on the ground, punch little holes in it and stick the seedlings through the hole into the soil. When used outside it, the strong Icelandic wind can sometimes be a

problem (although cardboard is heavier than newspapers, which can also be used as mulch, and therefore won't fly away quite so easily), so it would be good to place some compost or earth on top of it to keep it down. But inside the greenhouse this shouldn't be a problem.

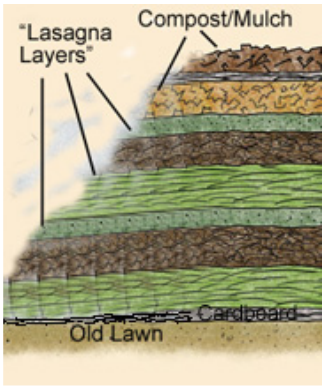
dd. for the worms

If Sólheimar decides to purchase a worm colony to speed up the composting process, cardboard could be added to what is fed to the worms. The worms love eating cardboard and take it apart very quickly. Even if there is ink on the cardboard, the worms are fine because nowadays inks are non-toxic. However, any plastic parts should be removed and no glossy materials should be fed to the worms. They also live more healthily and therefore work better, if they are not too cold. The container in which they are feeding should have a temperature between 15 and 25 °C. In Sólheimar, it can get quite cold, especially during the long winters. However, the nearby hot water source could be used to keep the worms warm. Another option would be to have the worms inside Sunna where it is warm all year around. However, keep in mind: not the temperature around the compost is important, but the temperature of the compost itself.

ee. Lasagna gardening

The "lasagna gardening technique" is a way of constructing a flower bed without any digging. It can be set up just about anywhere at the desired size and offers are nutrient-rich fluffy bed for plants. This would be a great way to set up little gardens for everyone in the community. Setting up a lasagna garden is a fun and (with some help from staff members) easy way for the home people to learn about the different components of healthy soil.

This is how it is done:



Select the place where you want to start your garden. Place a layer of corrugated cardboard on the ground, directly on the grass/weed. Wet the cardboard layer to keep it in place and to fasten the decomposing process. Now keep adding alternating layers of "wet" and "dry" materials (like on a compost pile). Wet materials are for example furuit and vegetable waste, coffee grounds, cut grass, manure, compost; dry materials are for example shredded newspaper and cardboard, leaves. The dry layer should be about twice as big as the wet layers. Keep piling up material until the bed is about 60 cm high and then wait for the materials to decompose and shrink down.

The ideal time to start a lasagna garden is in fall, as it allows the garden to decompose throughout the winter and be ready for planting in the springtime. When you see that the material has decomposed, the garden is ready to plant. The soil that was created this way is very easy to dig and plant in and is high in nutrients.

c. other

The cardboard sheets could also be shredded and the small pieces be used as protective material in packages. It can also be used for insolation when new buildings are built in the village.

B. Paper

Both office paper and newspaper can be reused.

1. What is now being done in Sólheimar

Paper is used in the Art workshop to make new colorful sheets of homemade paper. These are used for example as packaging of soaps.

2. What is being done in general

Most paper is recycled, and not reused. But of course there are many ways in which paper is already being reused throughout the world. Artists shred it to make beautiful new paper out of it, and farmers use it as bedding for animals or mix it with manure to turn it into compost. Newspapers are a popular choice for making mulch. There are also some more ambitious projects: Scientists in Japan have mixed food and paper waste, added yeast and enzymes, then saccharificated and perforated the mixture to turn it into ethanol – that means bio-fuel – with a concentration of 99,5%. (http://www.asiabiomass.jp/english/topics/1110_02.html)
Upon a request from our side, other eco-villages around the world have shared how they reuse cardboard waste: Dancing Rabbit (USA) make little flower pots out of old newspaper. These pots can hold seedlings and can be planted directly into the soil; in Acorn (USA), they add chopped up paper and newspaper to their compost piles; in Chrystal Waters (Australia), they use old paper as mulch, spreading out on their flower beds and covering it with straw or add it to their compost piles. The mulch adds nitrogen to the soil, keeps it moist and prevents weeds from growing. In the L.A. Eco village (USA), they also add paper to their compost pile. In Avalon Gardens (USA), they turn old paper into papercrete which they use to build flower beds, walls, benches, etc.

3. Practical suggestions what can be done in Sólheimar

Paper, much like its "thicker brother" cardboard, could be reused outside as well as inside. Office paper which is often used only on one side could be collected, cut into four smaller parts and then handed out in the different offices, workshops and even homes of Sólheimar as notepads.

a. in the Art workshop

The Art workshop is already making new colorful sheets of paper out of paper that was thrown away. Besides using this to wrap products from the soap workshop, the paper could also be turned into gift cards or stationary. Instead of shredding the paper and making new one, the used sheets – if they are clean – could also be put together in an easy way to form little paper bags. This would look very nice, especially with sheets that have interesting prints. These bags could be used as packaging for smaller products from the bakery.

b. in Sunna/Ölur

Paper, especially newspaper, can be reused as mulch. Just cut the paper in pieces (they don't have to be very small, they can even be used as a whole) and place around the plants. It is advised to wet the paper first to add moisture and to keep the pieces from flying away (which won't be a big problem inside the greenhouse). Colorful prints and glossy paper should be avoided and all plastic parts (sticky tape…) have to be removed first because they don't decompose. The ink is in general not a problem. Today non-toxic inks are used. The Icelandic agency responsible for certifying organic products (TÚN) has confirmed that using paper with ink doesn't affect the status of a vegetable as being "organic".

When the paper is still in sheets, it can be quite hard for the micro-organisms in the earth to take it apart; however, it can be shredded and then added to a compost pile. The resulting soil can then be used for planting. There shouldn't be too much paper in the soil though, as the cellulose that it is composed of is not nutritious for plants.
The paper could also be folded into little containers to hold vegetable seedling that can be put directly in the earth. With time, the seedling grows stronger and doesn't need the protection anymore and the paper will just decompose and "disappear".

c. other

If Sólheimar decides to buy a few sheep/cows, the paper could be shredded and used as bedding for the animals. The shredded paper is perfect for this as it is dry and therefore increases bacteria, it warms the floor and it sucks in moisture very well. The used material could later be mixed with the animals' manure and composted. Another advantage of having cows in Sólheimar would be that the amount of milk cartons could be reduced if the milk produced here was sold in bottles that are cleaned and reused after being emptied. Even if Sólheimar doesn't want to have its own cattle, we could still cooperate with a farmer who lives close by.
The paper (and cardboard) could also be turned into papercrete. It has to be blended into a fiber mulch and then mixed with cement. Then pour the fiber pulp into block molds and dry them out. These blocks can be used for building various types of structures such as walls, benches, flower beds, etc.

C. Tetra Paks/Milk cartons

1. What is being done in general

Most tetra paks are recycled. But they are also reused by artists who turn them for example into little wallets or by gardeners who use them as little containers to plant seedlings in. The fact that they are waterproof makes them very useful. They can be used as containers anywhere: in the kitchen, in an art workshop, in the garden…
Upon a request from our side, other eco-villages around the world have shared how they reuse cardboard waste: In Sieben Linden (Germany), milk cartons are folded into little wallets or book marks (contact the artist Nicoletta Geiersbach directly: nicoletta.sia@googlemail.com); in Den Selvforsynende Landsby (Denmark), the empty cleaned cartons are used to hold liquids in the freezer; in Dancing Rabbit (USA), people have used milk cartons to insulate their houses. The empty cartons form insulated air spaces and therefore work well for insulation, however this is not a long term-solution; in Chrystal waters (Australia), empty milk cartons with the top cut off are used to raise seedlings. They are planted directly into the ground. However, not all tetra paks are completely decomposable! Another way that milk cartons are reused in Chrystal Waters is by cutting off the top and placing them over small seedlings to prevent them from freezing.

2. Practical suggestions what can be done in Sólheimar

a. in the Art workshop

If the still have a closed bottom, milk and juice cartons could be cut in half and used as paint containers. They are water proof and even though they would have to be thrown away after a

few uses, they would at least be reused for some time. When cut open and laid out flat they also make great base to mix colors on.
Besides these practical ways of reusing the cartons, they can also be reused in more artistic ways: They can be turned into purses/wallets (http://www.cutoutandkeep.net/projects/milk_carton_coin_purse), book marks, baskets (http://diyhowtodo.blogspot.com/2011/02/diy-milk-carton-basket-no-glue-part-1.html#axzz1ocFiCWrZ), bird houses (http://www.chasinggreen.org/article/20-ways-reuse-milk-and-juice-cartons/), lanterns (http://shihoscraftcafe.wordpress.com/2009/03/30/milk-carton-lantern/)… They can also be used as containers for molding candles: just pour the liquid wax in the container and you have a perfectly shaped candle (http://www.craftbits.com/project/ice-candle).

b. in Sunna

Milk cartons cut in half are ideal for planting new plants. They can even be placed into the soil with the carton and it will eventually decompose (though this does take quite some time, depending on the different layers used for the carton). The open milk cartons can also be placed on top of small plants to protect them from cold and bugs.

c. other

Residents of Sólheimar could clean empty milk or juice cartons and cut off the upper half. The lower half can be used as a container for food left overs. They are also great for freezing leftover soups etc.

III. Solution

The most important thought to keep in mind is: the huge amount of waste is a problem that can only be solved if many work together. One workshop cannot solve the problem alone.
But while it is necessary to keep in mind all the different options of reusing the garbage, it would also be good to try and “think big”: There are ways and methods to reuse small amounts of waste material; however we need to focus on ways that allow Sólheimar to reuse large quantities of the waste. Depending on the material and the possibilities to reuse it, the most effective solution should be adopted first.
Lastly, it might also be a good idea to create a new workshop: A Recycling workshop. This workshop could for example be in the part of Sólheimarhús which will soon be torn down and then reconstructed. In this workshop, all recyclable materials (mainly the ones dealt with in this report: paper, milk cartons, and corrugated cardboard) could be assembled and stored in an orderly way. This would allow everyone who comes up with a way to use one of those materials in his workplace to go there and immediately have access to it.