



Design for Life

Part 1 of 3

FLOWFORM™ ECO-TECHNOLOGY

TRANSFORMING DAIRY SHED EFFLUENT INTO LIQUID FERTILIZER

FLOWFORM™ TECHNOLOGY

Flowform™ eco-technology is an elegant combination of effective methods that nature has used for eons to improve water - the active vitality of the mountain stream and the living pulse of nature. The unique Flowform™ signature is streaming water over designed surfaces that generate figure8 flow patterns and a steady rhythmic pulse. This effectively becomes a vigorous cascading 'superstream', equivalent to a natural mountain stream several times its length, because of the repeating left to right, figure8 streaming flow.

The Healing Water Institute (NZ charitable trust) and Design for Life Co Ltd (NZ) have developed a method that transforms dairy shed effluent into liquid fertilizer over a few weeks, so it can be sprayed out over paddocks that absorb it, allowing cows quickly back onto the healthy and clean grass.

This method can also be used in conjunction with other biological treatment systems, with a high likelihood of increasing their effectiveness.

Flowform technology has been available for nearly 40 years but in the recent development of bio-mimicry appreciation and concern for the damage humanity is doing to the environment, it is only recently becoming understood generally.

Our group has the means of manufacturing large numbers of Flowform products for wide scale application, and is able to technically back up installations.

We are applying for a grant to gather more information on the 10 dairy shed effluent and related treatment installations set up over the last 20 years.

This document is a three part collation of proceedings brought together for the purpose of providing a working solution to an intractable and ubiquitous environmental problem.

DAIRY EFFLUENT PROBLEMS.

The burden of dairy milk herds' effluent on fresh water worldwide is acknowledged to be a very serious problem for a variety of reasons. Effluent is released onto the paddocks and also onto the dairy shed floor during milking. Proper levels of stocking and field management helps to manage the first, while the second is hosed off the dairy shed floors twice a day into ponds. These ponds need emptying out and are then applied onto the farmer's land.

All such organic waste managed well goes through a 'composting' process, where the fresh cow manure becomes anaerobic and smelly, before becoming aerobic and relatively sweet smelling. Add that point it is able to be applied to the land beneficially.

Almost without exception, the 'waste' ponds do not reach the aerobic end process of managed organic transformation into fertilizer, and are applied onto fields while still anaerobic. This leaves an unhealthy sludge layering the fields, affecting microorganisms and the grass, and keeping the cows from returning quickly to the paddocks.

Much of this waste leaches into fresh water off the farm, if it is not still running directly into it in some countries, reducing water's capacity to support healthy life in the general environment. The material adds to nitrogenous overload of water, which is now even adding to 'dead zones' in delta/ocean regions worldwide.

Looking at NZ's dairy industry as an example:

- There are 17,000 dairy farmers in NZ including both owners and share milkers. The dairy cow population in 2004 was 3.85 million. The average herd has doubled to 300 animals over the last 20 years. (<http://www.rogerdickie.co.nz/coldstream/dairyfarmingtoday.htm>)
- Bearing in mind that one cow is equivalent to many human beings with regard to effluent waste output we are faced with a huge issue, in a farming environment where animals are farmed intensively with little being done to thoroughly transform the effluent, which overflows sedimentation ponds, filtering and flowing into our fresh water systems.

BACKGROUND to FLOWFORM TECHNOLOGY

Flowform water has been studied for many years since the invention of the Flowform Principle in 1970 by John Wilkes. Apart from their aesthetic qualities, Flowforms do appear to have significant ecological and environmental applications and effects. A comparative study undertaken by Dipl. Phys. Christian Schönberger and Prof. Christian Liess in Überlingen, Germany, on research articles about Flowforms indicates that the qualities and properties of water, which is running through a cascade of Flowforms, are altered (Schönberger and Liess 1995). Penetrated by rhythmical movements, Flowform-treated water not only becomes highly oxygenated, but also supports rhythmic biological regenerative processes more intensively (Wilkes 2003).

Modern material science which considers water structure (physics) as a different study to its chemical makeup (chemistry) provides a firm theoretical basis for the apparent influences that the Flowform bio-mimicry technology creates.

At time of writing the Healing Water Institute (UK and NZ) is preparing to publish a 100 page collation of Flowform Water Research from 1970 until 2005. The following examples give some indication of the validity of Flowform eco-technology.

1. In four test runs in a Flowform system receiving communal laundry water near 'The Channon' in New South Wales, Australia, the *biochemical oxygen demand* was reduced from an average of 424 to less than 20 mg/l over a 105 min period. Within this period, *faecal coliform* counts were reduced from an average of approximately 3100cfu/100ml to a level of 500cfu/100ml, and the amount of *dissolved oxygen* increased steadily from 0.1 to 3.9 ppm. (The dissolved oxygen (DO) concentration for 100% air saturated water at sea level is 8.6 mg O₂/L (ppm) at 25°C and increases to 14.6 mg O₂/L (ppm) at 0°C.) These results demonstrate the capacity of the Flowform system to break down organic matter and reduce bacterial contamination (Spencer 1995). Similar results have been found in a dairy farm in NZ.
2. In a system of ponds for wastewater treatment using Flowforms in Solborg, Norway, an oxygen enrichment from 30% to 90% was detected between the inlet and outlet within a Flowform cascade (Mæhlum 1991, Schönberger and Liess 1995). The continuous rhythmical movements induced by the cascade also prevented freezing of the pond in winter.
3. In the same installation, between the deposition pit and the 3rd pond, the content of chloride in the water was reduced by more than half (Mæhlum 1991, Schönberger and Liess 1995). Since chloride is hardly decomposed in nature, it was supposed that the chloride reduction was caused by intrusion of surrounding water and dilution. Measurements of the inflowing and out flowing water however showed that the reduction of chloride is stronger than would be possible through dilution (Mæhlum 1991).
4. The transmission coefficients for oxygen in a Flowform cascade is very similar to a meandering step cascade (Flowform Järna 0,39 / Flowform Malmö 0,45 / Flowform Olympia 0,49 / step cascade 0,46) (De Jonge 1982, Schönberger and Liess 1995).
5. Flowform water had a pH-value which increased by 0.77 compared to untreated water, whereas the electrical conductivity decreased (Brückmann et al. 1992).
6. In a system for human wastewater treatment in Järna, Sweden, containing seven Flowform cascades it was shown that pond water could be efficiently cleansed with respect to pathogen bacteria (Sernbo and Fredlund 1991, Schönberger and Liess 1995). The outlet of the installation leads into the Järna fjord, where the wastewater has such a high quality that micro-organisms and higher organisms prosper as well as they do in fjord water (Alleslev 1987).
7. Comparative Flowform and Step Cascade Ponds at Warmonderhof Agricultural University, Holland:
 - In the step cascade system (no Flowforms) in Warmonderhof, there was a higher number of species of organisms which prefer darker habitats (deep water and bottom dwellers) and have softer and rounded shapes, move slower and often go through a life cycle with a flying stage, such as midge larvae.
 - In the Flowform system, more organisms were found that prefer regions of light (upper water layers and surface); those have more differentiated and indented forms, more nervous movements and go through a life cycle remaining in water, such as water mites and crustaceans.
 - The mobility of fish was higher in the Flowform system compared to the step cascade (Van Mansfeld 1986, Wagenaar 1984, Schönberger and Liess 1995).

- Observations showed that in the step cascade system the water appeared more cloudy and had a musty smell of ammonia, whereas the Flowform system had clearer water and a humus and hay like smell (Van Mansfeld 1986).
8. In addition many scientifically untested practical installations have had reports such as
- Piggery : Broom Farm, Sussex England. David Clements in the 1970s used the Jarna form, and the anaerobic smell went and they could spray without problems.
 - Abattoir: Chicken Abattoir, Byron Bay, NSW. Australia. This abattoir slaughtered 26,000 chickens three to five times per week. The washing from the slaughter room went through a clarifier into a 4.3 megalitre pond. From there water is used for irrigation on an onsite turf farm. The stench caused neighbors to complain and the Environmental Protection Agency were about to close them down when the Flowforms were set up. Dissolved oxygen readings were zero. We installed three sets of seven Vortex Flowforms and within two weeks of continuous running the pond's dissolved oxygen was 2.3 ppm. By the end of the sixth week we had readings of 6.3 ppm. The neighbors rang to inquire where the smells had gone. The Environmental Protection Agency has extended their license, with the added construction of gravel filters and reed beds,

The FLOWFORM™ System:

The FLOWFORM™ System introduces Flowform cascade technology either to existing large effluent ponds and/or to specially installed tanks that receive the first and richest hoseings from the dairy shed floor. In effect, this supplies a 'superstream' for the liquid to repeatedly flow through, capable of informing the liquids biologically and increasing its capacity to support life and transform the material within it.

In New Zealand and Australia, we have successfully installed eight systems in operating Biodynamic dairy farms over the last 20 years. All farmers were pleased with observable results and quickly learned to manage the process from observation. Some farmers are still in operation, while others have sold their farms and moved on.

- The dairy shed effluent is oxygenated and enlivened through a thorough vortical figure8 mixing down a cascade of industrial Flowform designs. It is efficiently transformed from an anaerobic sludge into a sweet smelling aerobic liquid fertilizer over a period of two weeks or so.
- This transforms what has been regarded as a waste product into an effective liquid fertilizer, easily assimilated by paddocks for the benefit of the soil, grass and cows.
- This not only saves expense on fertilizer for those paddocks but also improves Regional Council requirements to improve run off into public water off site.
- Flowform eco-technology has been used in 2400+ very different projects (agricultural, industrial and domestic) in over 30 countries around the world since their invention in 1970, and it is receiving special attention from leading scientists in the last few years.
- Flowform designs are modern, elegant examples of biomimicry at its best. Like nature itself they are artistic, technically efficient and therapeutic experiences all at the same time. In particular, green business leaders in the United States are expressing great interest in our intellectual property.

- The Healing Water Institute situated in England and New Zealand is collating 30 years of research and project case studies to show the technical validity of the Flowform usage.
- Essentially Flowform Cascades, re-create the water treatment effectiveness of a mountain stream combined with the life enhancing capacities of organic rhythms that inform the molecular cluster structures has now described by leading university researchers.
- Flowform Technology oxygenates, polishes and rhythmically influences water using methods nature has perfected over many millions of years.

Please refer to Project Descriptions Section..

Method:

- Use side-by-side concrete ponds (A and B) built near the cow shed for the richer main hosings to gravity feed into.
- Weaker hosings sent off down to the larger digger ponds.
- Place Flowform cascade on metal stand between the ponds in order that the flow can be pumped up out of and returned to either Pond A or Pond B.
- Have the top end of the stand placed towards the middle of the ponds (between the two if possible). This means the outflow of the cascade will come down near the long end of the tanks. This allows for easy funneling of the flow off to one pond or the other.
- When Pond A is full you treat it while the other Pond B is being filled. When Pond B is filled, Pond A is sprayed out onto paddocks, and treatment through the Flowforms turned over to Pond B. Pond A is refilled during this time. And so forth.
- Use an effluent submersible pump delivering a minimum of 150 liters per minute to 2 metres above the top of the ponds.
- Experience with water has shown that when flowing it responds best to enlivening treatment out of the sunshine. Run the Flowforms through the night is effective.
- Our experience is that the Flowform water treatment technology increases the speed of anaerobic / aerobic transformation, combined with organic catalytic converters we add.
- Alternatively, be Flowform cascades can be set up beside existing large ponds.

Compiled by Iain Trousdell.

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