From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:10 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25024 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:10:45 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10497; Mon, 13 Mar 1995 02:33:56 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3833 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:26:24
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3231; Mon, 13 Mar 1995 08:26:24 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:26:23 +0100
Received: by ki.se id AA10501 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:32:21 +0100
Posted-Date: Mon, 13 Mar 1995 03:10:45 -0500
Received-Date: Mon, 13 Mar 1995 03:10:45 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130840.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:32:21 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P26: Abstract - Amanda Hogelin & Gunno Renman (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1022

Where to Apply Ecotechnological Measures In the Landscape? A Case Study Within a Watershed Near Stockholm, Sweden

Amanda Hogelin and Gunno Renman
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm, Sweden

The excessive load of nutrients into the water system of Akerstrommen, near Stockholm, Sweden, was investigated and quantified. This data and landscape information created the basis for evaluation of optimal solutions for reducing the load. The territory is mainly rural, with settlements spread out over the entire area, and with agriculture and forestry as predominating activities. The methods to identify point and non-point sources of pollution, and to investigate natural environmental prerequisites for adapting ecotechnological measures are described. Rehabilitation of the landscape by creation or development of wetlands and ecotones and prevention of nutrient load from failing septic systems are of particular importance.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:22 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25205 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:22:24 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10460; Mon, 13 Mar 1995 02:33:07 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3820 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:25:33
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3210; Mon, 13 Mar 1995 08:25:32 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:25:30 +0100
Received: by ki.se id AA10251 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:31:30 +0100
Posted-Date: Mon, 13 Mar 1995 03:22:24 -0500
Received-Date: Mon, 13 Mar 1995 03:22:24 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130819.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:31:29 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P25: Abstract - U.Mander (Estonia) & L.Vought (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 4809

Nitrogen and Phosphorus Removal in Riparian Alder Forests

Ulo Mander1 & Lena Vought2
1 Department of Geography, University of Tartu, Estonia
2 Limnology Institute, University of Lund

Alder (Alnus spp.) forests are typical riparian ecosystems in Europe which can retain and transform nutrient fluxes from adjacent intensively used territories. However, only few studies have been thoroughly carried out to investigate their buffering capacity and the results show contradictory findings (Knauer and Mander, 1989; Binkley et al., 1992; Vought et al., 1994). Due to atmospheric nitrogen fixation by root nodules containing an actinomycetal fungal endophyte (up to several hundred kg N ha-1 year-1), alders have been expected to act as an additional source of nitrogen pollution of water bodies. In addition, via the intensive nitrogen load, the phosphorus cycling can be heavily affected. In this paper, preliminary results of two studies on nitrogen and phosphorus removal in riparian alder forests of different type will be presented. The first study has been carried out in 1993 in the Lake Hammarsj|n catchment, Scania, Sweden. The main aim was to find out differences in N and Pconcentrations in soil and soil water of differently aged black alder stands. In each of five study sites around the Lake Hammarsj|n, three age classes (1-5, 10-20, and

30-50 years) of black alder (Alnus glutinosa L.) stands, and for comparison, one grassland patch and one willow (mainly Salix caprea L.) stand have been investigated. Soil samples (from 0-10 and 30-40 cm depth) and soil water samples (0,3-1,2 m) were taken as 7 replicates and analyzed for pH,total-N, NH4, NO2,NO3, total-P and PO4 concentration. Preliminary results enable to draw the following conclusions: (1) there is a slight increase in nitrogen concentration both in soils and soil water within the older (>30 years) black alder forest stands, however, the variation of values both between sites and replicates is high; (2) a significantly higher concentration of phosphorus was found in the soils and soil water under the grasslands, nevertheless, there was no significant differences in phosphorus concentrations of differently aged alder stands; (3) older black alder stands may serve as additional sources of nitrogen pollution, therefore, a regular harvesting of these communities is to be recommended to avoid nitrogen and phosphorus accretion within riparian zones. Another study has been planned for 1994-1995 and is carried out in two differently loaded white alder (Alnus incana (L.) Moench.) stands in South Estonia: one in the natural conditions without any significant groundwater/overland flow inputs (in the Porij|gi Rivercatchment, Tartu County), and another downslope from the point pollution source (large pig farm complex with an intensively used pasture; Viiratsi, Viljandi County). The main problem of this study was to clarify the ability of white alder forests, the most typical ecosystems of riparian areas in Estonia and adjacent territories, to retain the additional N and P fluxes from intensively used agricultural fields and farms, and relocate these to the internal cycling via the acceleration of biomass production and humus formation. For this purpose, the following main N and P cycles and budgets have been estimated: inputs (atmospheric deposition, groundwater and overland flow), transformation and storage (above-ground plant biomass, below-ground plant biomass, net primary above-ground production, primary below-ground production, soil organic matter, autumn retranslocation from senescing leaves, leaching from canopies, litter fall, leaching from litter fall and whole tree mortality, litter mineralization, nitrogen fixation by alder nodules, nitrification, accumulation in soil), outputs (denitrification, leaching into the groundwater and stream). The preliminary results of the first study year enable to conclude that despite the heavy additional load over atmospheric deposition and polluted overland/subsurface flow the buffering capacity of white alder forest stands is approximately the same as in the unloaded area. The additional N and P fluxes will are compensated with increasing biomass productivity (also, within meadow communities dominating by Filipendula ulmaria, Cirsium oleraceum, Aegopodium podagraria, and Urtica dioica), higher denitrification value, and humus formation. Anyway, an effective and normal way of nutrient removal from riparian zones is biomass harvesting. Estimated average annual denitrification rate within riparian white alder stands and meadows will be about 1700 kg N ha-1year-1 then, in addition, the nutrient removal via harvesting could remove 30 % of annual nitrogen accumulating both in vegetation and soils. For phosphorus this rate will be probably 20 %.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:22 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25205 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:22:24 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10460; Mon, 13 Mar 1995 02:33:07 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3820 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:25:33
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3210; Mon, 13 Mar 1995 08:25:32 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:25:30 +0100
Received: by ki.se id AA10251 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:31:30 +0100
Posted-Date: Mon, 13 Mar 1995 03:22:24 -0500
Received-Date: Mon, 13 Mar 1995 03:22:24 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130819.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:31:29 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P25: Abstract - U.Mander (Estonia) & L.Vought (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 4809

Nitrogen and Phosphorus Removal in Riparian Alder Forests

Ulo Mander1 & Lena Vought2
1 Department of Geography, University of Tartu, Estonia
2 Limnology Institute, University of Lund

Alder (Alnus spp.) forests are typical riparian ecosystems in Europe which can retain and transform nutrient fluxes from adjacent intensively used territories. However, only few studies have been thoroughly carried out to investigate their buffering capacity and the results show contradictory findings (Knauer and Mander, 1989; Binkley et al., 1992; Vought et al., 1994). Due to atmospheric nitrogen fixation by root nodules containing an actinomycetal fungal endophyte (up to several hundred kg N ha-1 year-1), alders have been expected to act as an additional source of nitrogen pollution of water bodies. In addition, via the intensive nitrogen load, the phosphorus cycling can be heavily affected. In this paper, preliminary results of two studies on nitrogen and phosphorus removal in riparian alder forests of different type will be presented. The first study has been carried out in 1993 in the Lake Hammarsj|n catchment, Scania, Sweden. The main aim was to find out differences in N and Pconcentrations in soil and soil water of differently aged black alder stands. In each of five study sites around the Lake Hammarsj|n, three age classes (1-5, 10-20, and

30-50 years) of black alder (Alnus glutinosa L.) stands, and for comparison, one grassland patch and one willow (mainly Salix caprea L.) stand have been investigated. Soil samples (from 0-10 and 30-40 cm depth) and soil water samples (0,3-1,2 m) were taken as 7 replicates and analyzed for pH,total-N, NH4, NO2,NO3, total-P and PO4 concentration. Preliminary results enable to draw the following conclusions: (1) there is a slight increase in nitrogen concentration both in soils and soil water within the older (>30 years) black alder forest stands, however, the variation of values both between sites and replicates is high; (2) a significantly higher concentration of phosphorus was found in the soils and soil water under the grasslands, nevertheless, there was no significant differences in phosphorus concentrations of differently aged alder stands; (3) older black alder stands may serve as additional sources of nitrogen pollution, therefore, a regular harvesting of these communities is to be recommended to avoid nitrogen and phosphorus accretion within riparian zones. Another study has been planned for 1994-1995 and is carried out in two differently loaded white alder (Alnus incana (L.) Moench.) stands in South Estonia: one in the natural conditions without any significant groundwater/overland flow inputs (in the Porij|gi Rivercatchment, Tartu County), and another downslope from the point pollution source (large pig farm complex with an intensively used pasture; Viiratsi, Viljandi County). The main problem of this study was to clarify the ability of white alder forests, the most typical ecosystems of riparian areas in Estonia and adjacent territories, to retain the additional N and P fluxes from intensively used agricultural fields and farms, and relocate these to the internal cycling via the acceleration of biomass production and humus formation. For this purpose, the following main N and P cycles and budgets have been estimated: inputs (atmospheric deposition, groundwater and overland flow), transformation and storage (above-ground plant biomass, below-ground plant biomass, net primary above-ground production, primary below-ground production, soil organic matter, autumn retranslocation from senescing leaves, leaching from canopies, litter fall, leaching from litter fall and whole tree mortality, litter mineralization, nitrogen fixation by alder nodules, nitrification, accumulation in soil), outputs (denitrification, leaching into the groundwater and stream). The preliminary results of the first study year enable to conclude that despite the heavy additional load over atmospheric deposition and polluted overland/subsurface flow the buffering capacity of white alder forest stands is approximately the same as in the unloaded area. The additional N and P fluxes will are compensated with increasing biomass productivity (also, within meadow communities dominating by Filipendula ulmaria, Cirsium oleraceum, Aegopodium podagraria, and Urtica dioica), higher denitrification value, and humus formation. Anyway, an effective and normal way of nutrient removal from riparian zones is biomass harvesting. Estimated average annual denitrification rate within riparian white alder stands and meadows will be about 1700 kg N ha-1year-1 then, in addition, the nutrient removal via harvesting could remove 30 % of annual nitrogen accumulating both in vegetation and soils. For phosphorus this rate will be probably 20 %.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:01 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA22890 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:01:14 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10430; Mon, 13 Mar 1995 02:31:56 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3798 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:24:23
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3177; Mon, 13 Mar 1995 08:24:15 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:24:12 +0100
Received: by ki.se id AA09693 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:30:11 +0100
Posted-Date: Mon, 13 Mar 1995 03:01:14 -0500
Received-Date: Mon, 13 Mar 1995 03:01:14 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130834.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:30:11 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P24: Abstract - Yan Jingsong (P.R.China)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1804

Organic Wastewater Recovery, Conversion, Reuse and Recycling in a Pharmaceutical Factory

Yan Jingsong
Nanjing Institute of Geography & Limnology, Academia Sinica, Nanjing, China

Boyin pharmaceutical factory mainly produces 12,000 t of starch, 4,000 t of glucose and discharges 200,000 t of highly concentrated wastewater a year. A plan for treatment and utilization of this wastewater is being put in practice.

The first step of this plan is annual recovery of about 300 t of starch, protein and oil from the wastewater, and reduction of 70-80% of BOD and COD of this wastewater. The second step is conversion of some remaining organic matter and inorganic nutrients into food and green fodder. The water after treatment is reused for production in this pharmaceutical factory.

The remained green fodder of duck that is not used in the animal food production, is used for raw materials of biogas fermentation. The biogas is used as one of the energy sources of this factory. The waste liquid residue from biogas production is used for top dressing and as a harmless pesticide for the corn and vegetable fields or culture solution for

hydroponic cultivation of vegetables and green fodder. The solid slag from biogas fermentation is used as a part of the foods of cultured fish and a cultivation medium for edible fungi. The residue and detritus of fungus beds after harvesting mushrooms is used as the medium for earthworm breeding. The earthworms are then recycled into the system. Also the excrement of fish and mud from the pond are recycled.

The processes combines ecological engineering for treatment and utilization of organic wastewater by multilayer and graded utilization of waste in all or most processes of production, and beneficial recycling in this system to make zero discharge.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:21 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25194 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:21:23 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10420; Mon, 13 Mar 1995 02:31:47 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3796 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:24:11
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3173; Mon, 13 Mar 1995 08:23:27 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:23:24 +0100
Received: by ki.se id AA09637 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:29:23 +0100
Posted-Date: Mon, 13 Mar 1995 03:21:23 -0500
Received-Date: Mon, 13 Mar 1995 03:21:23 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130848.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:29:22 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P20: Abstract - Lena Johanson et al (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 734

Light Expanded Clay Aggregates (LECA) as Reactive Filter Media in Constructed Wetlands

Lena Johansson, Gunno Renman and Hans Carlstrom
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm, Sweden

Light expanded clay aggregates (LECA) have proved to be a suitable medium for removal of phosphorus from polluted water. The material, in the grain size range 0-4 mm, has successfully been used in constructed wetlands and in other applications as well. Results from different laboratory investigations, batch and column experiments on LECA are presented. Mechanisms responsible for the phosphorus removal, i.e. anion exchange and adsorption, are discussed.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:15 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25120 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:15:46 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) wth SMTP id CAA10379; Mon, 13 Mar 1995 02:30:21 -0500

Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3786 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:22:45
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3157; Mon, 13 Mar 1995 08:22:45 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:22:41 +0100
Received: by ki.se id AA09384 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:28:40 +0100
Posted-Date: Mon, 13 Mar 1995 03:15:46 -0500
Received-Date: Mon, 13 Mar 1995 03:15:46 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130808.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:28:40 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P19: Abstract - P. Kowalik et al (Poland)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 805

Constructed Wetland for Landfill Leachate Treatment

P. Kowalik, F. Slater and P. Ranudeonen
Technical University of Gdansk, Gdansk, Poland

The constructed wetlands received much attention for treatment of wastewater from rural areas and sites with seasonally fluctuating loads. The landfill leachate treatment on the constructed wetland occurs due to the interaction of the wastewater with soil, vegetation and microorganisms. A case study of leachate treatment from Wales (U.K.) is presented, from Nantmel tip. Measurements of nitrogen transformation in a reed bed indicate that it is capable of successfully treating landfill leachate. It is vital to make sure how this technique may be applied under a variety of different site and climate conditions and to determine its long-term sustainability.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:18 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25168 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:18:12 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10355; Mon, 13 Mar 1995 02:29:36 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3771 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:22:01
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3133; Mon, 13 Mar 1995 08:22:01 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:21:59 +0100
Received: by ki.se id AA09115 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:27:59 +0100
Posted-Date: Mon, 13 Mar 1995 03:18:12 -0500
Received-Date: Mon, 13 Mar 1995 03:18:12 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130853.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:27:58 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P18: Abstract - P.D.Jenssen & T.Mahlum (Norway)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1359

Treating Domestic Wastewater and Landfill Leachate In Norway Using Constructed Wetlands

Petter D. Jenssen1 and T. Mahlum2
1 Department of Agricultural Engineering , Agricultural University of
  Norway, Aas, Norway
2 Centre for Soil and Environmental Research , Aas, Norway

This paper presents the design and performance of three constructed wetlands (CWs) for point source pollution abatement in Norway: two plants for treating domestic wastewater and one plant for treating landfill leachate. Results show that wastewater treatment plants reduce BOD 85%, N 50% and P 95% from total input. Moreover, there is no significant seasonal difference in purification performance. Both wastewater treatment plants contains reactive porous media (LECA) that has a high phosphorus removal capacity. The system treating municipal landfill leachate consists of a sedimentation/anaerobic pond, followed by an aeration pond, then two sub-surface CW units: one filled with gravel and one with LECA. The last maturation stage is an overland flow CW. Point samples indicate high removal (>85%) of N, P, BOD and Fe.

Due to the cold climate, it is questioned if CWs can operate year around in Norway. Modelling of heat exchange and experience indicate that

freezing is not a major problem and that insulation may maintain hydraulic performance in extremely cold climates.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 02:55 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA18845 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 02:55:31 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10323; Mon, 13 Mar 1995 02:28:28 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3750 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:20:45
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3105; Mon, 13 Mar 1995 08:20:44 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:20:43 +0100
Received: by ki.se id AA08814 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:26:42 +0100
Posted-Date: Mon, 13 Mar 1995 02:55:31 -0500
Received-Date: Mon, 13 Mar 1995 02:55:31 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130855.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:26:42 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P15: Abstract - Marie Adamsson et al (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1246

Toxicity Identification Evaluation at the Stensund Wastewater Aquaculture

Marie Adamsson1, Gran Dave1, Lars Forsberg2 and Bjorn Guterstam2
1 Department of Zoophysiology, University of Gothenburg, Gothenburg, Sweden
2 Stensund Ecological Center, Trosa, Sweden

Ecological techniques for treatment of domestic wastewater have been used since 1989 at the Stensund Wastewater Aquaculture plant in Sweden. The purification concept is to use an artificial food chain (algae, zooplankton and fish) combined with hydroponic culture of higher plants to further deplete the nutrients in the wastewater. However, the production of algae and zooplankton has not been working as expected from pilot studies. The purpose of this investigation was to study if toxic chemicals were limiting the production of zooplankton (Daphnia magna) in the aquaculture treatment system. The results showed that toxicity in the raw wastewater was due to higher metal concentrations, especially Cu, and ammonia. After the primary treatment in the anaerobic tank the toxicity was due to hydrogen sulphide and/or ammonia. Therefore, a successful cultivation of zooplankton like D. magna at Stensund was highly dependent upon a successful control of the ammonia concentration.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:10 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25028 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:10:51 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10247; Mon, 13 Mar 1995 02:27:19 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3735 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:19:48
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3081; Mon, 13 Mar 1995 08:19:48 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:19:46 +0100
Received: by ki.se id AA08564 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:25:46 +0100
Posted-Date: Mon, 13 Mar 1995 03:10:51 -0500
Received-Date: Mon, 13 Mar 1995 03:10:51 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130816.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:25:45 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P14: Abstract - Lars-Erik Forsberg (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 925

Stensund Wastewater Aquaculture: Operational aspects of nitrification

Lars-Erik Forsberg
Stensund Ecological Center, Trosa, Sweden

Stensund Wastewater Aquaculture uses a constructed food chain of phytoplankton, zooplankton, and fish to treat about 6 m3/day of domestic sewage water. A study of the nitrification process in aquaculture was done during the period January 1994 to February 1995. Nitrification is a crucial process which is a prerequisite for the cultivation of zooplankton and fish in the constructed aquatic food web. It is therefore important to have a successful nitrification in the early stages of the wastewater aquaculture and at the same time control pH and temperature. Results indicate the possibilities to regulate nitrification. The delicate relation between heterotrophic BOD reducing bacteria and autotrophic nitrifying bacteria and their functional relation to higher organisms is discussed.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:16 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25132 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:16:49 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10227; Mon, 13 Mar 1995 02:26:44 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3725 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:19:13
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3067; Mon, 13 Mar 1995 08:19:12 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:19:10 +0100
Received: by ki.se id AA08323 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:25:10 +0100
Posted-Date: Mon, 13 Mar 1995 03:16:49 -0500
Received-Date: Mon, 13 Mar 1995 03:16:49 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130833.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:25:09 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P13: Abstract - Julija Auzane (Latvia)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 887

Stensund Wastewater Aquaculture: Operational aspects of phytoplankton and zooplankton populations

Julija Auzane
Stensund Ecological Center, Trosa, Sweden & University of Latvia, Riga, Latvia

Stensund Wastewater Aquaculture uses a constructed food chain of phytoplankton, zooplankton, and fish to treat about 6 m3/day of domestic sewage water. A study of several water quality parameters and populations of phytoplankton and zooplankton was done during four months in winter and spring 1994. Different species of the phytoplankton groups Cyanophyta, Diatomophyceae and Chlorophyta were identified. The phytoplankton growth was mainly limited by light intensity. Zooplankton populations grazed on particulate organic matter, including bacteria and phytoplankton. For the operation of an indoor aquaculture in northern latitudes, seasonal variations in productivity must be considered.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:18 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25171 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:18:14 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10199; Mon, 13 Mar 1995 02:25:59 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3705 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:18:26
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3043; Mon, 13 Mar 1995 08:18:26 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:18:24 +0100
Received: by ki.se id AA08284 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:24:24 +0100
Posted-Date: Mon, 13 Mar 1995 03:18:14 -0500
Received-Date: Mon, 13 Mar 1995 03:18:14 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130846.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:24:23 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P12: Abstract - Teresa Ozimek (Poland)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 792

Can a Lemna System be Used for Sewage Treatment in Countries of Temperate Zone: Polish Examples

Teresa Ozimek
University of Warsaw, Zoological Institute, Department of Hydrobiology, Warsaw, Poland

Pollution of water is a serious problem in Poland. Recently, a growing interest has been shown for unconventional sewage treatment by the use of hydrophytes. Corporations from Denmark, Germany and United States have promoted different types of hydrophyte systems for sewage treatment in Poland, i.e. the Lemna (duckweed) system. The use of that system for sewage treatment in countries of temperate zone is discussed on the basis of studies on phenology, population growth rate, and efficiency of Lemna to accumulate nitrogen and phosphorus under different temperature and light conditions.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:05 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA24929 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:05:38 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10178; Mon, 13 Mar 1995 02:25:18 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3696 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:17:42
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3023; Mon, 13 Mar 1995 08:17:42 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:17:39 +0100
Received: by ki.se id AA08017 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:23:38 +0100
Posted-Date: Mon, 13 Mar 1995 03:05:38 -0500
Received-Date: Mon, 13 Mar 1995 03:05:38 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130802.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:23:38 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P5: Abstract - Jaana Aaltonen and Per Andersson (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1243

Durability and Maintenance of Ecotechnological Wastewater Systems

Jaana Aaltonen and Per Andersson
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm, Sweden

Existing constructions of constructed wetlands and infiltration in constructed soil beds operating under various climatic conditions in Sweden were subject to data sampling aiming to explain general trends and experiences of long-term management. The data series from various districts in Sweden were consolidated to give a picture of N and P removal in soil filter beds over a long time.The data series for N extends over 9 years, and for P over 16 years. The results show a trend of declining purification efficiency of both N and P. The range of purification efficiency is however notable. Data from other types of treatment plants were too limited to give any trend. The purification efficiency showed a notable seasonal variation, even though the municipalities most often stated that no such difference occurred. Sixteen discontinued plants were found and the closings were mainly related to function, in terms of defective construction and clogging, and not in relation to saturation of N or P.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 02:44 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA18132 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 02:44:44 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10159; Mon, 13 Mar 1995 02:24:27 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3685 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:16:56
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3008; Mon, 13 Mar 1995 08:16:56 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:16:54 +0100
Received: by ki.se id AA07769 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:22:54 +0100
Posted-Date: Mon, 13 Mar 1995 02:44:44 -0500
Received-Date: Mon, 13 Mar 1995 02:44:44 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130823.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:22:53 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P4: Abstract - Erik Karrman (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 869

Evaluation of Various Wastewater Systems, Methods and Applications

Erik Karrman
Department of Sanitary Engineering, Chalmers University of Technology,
Gothenburg, Sweden

A study was done to form evaluation criteria and to compare various wastewater systems. The evaluated aspects were: economics, land surface requirement, energy, recycling of phosphorus and nitrogen, and losses of phosphorus and nitrogen to recipients. The five aspects were applied to six existing Swedish wastewater systems. These six examples included three conventional systems with wastewater pipes and treatment plants, one system with stabilization ponds and irrigation with treated wastewater, one system with wastewater treatment in a constructed wetland, and, finally, a small-scale system with composting toilets for blackwater and constructed wetland and a sand filter for graywater.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 02:51 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA18311 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 02:51:18 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10143; Mon, 13 Mar 1995 02:23:52 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3668 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:16:19
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 2981; Mon, 13 Mar 1995 08:16:19 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:16:16 +0100
Received: by ki.se id AA07614 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:22:16 +0100
Posted-Date: Mon, 13 Mar 1995 02:51:18 -0500
Received-Date: Mon, 13 Mar 1995 02:51:18 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130835.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:22:15 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P3: Abstract - Petter D. Jenssen (Norway)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1021

Natural Systems Technology: An Ecological Approach to Wastewater Treatment in Norway

Petter D. Jenssen
Department of Agricultural Engineering, Agricultural University of Norway, Aas, Norway

Norwegian legislation and education advocate centralized, "end of line" solutions for wastewater treatment. In rural areas, such systems often become costly. Given an ecological approach, which involves holistic environmental considerations, it is questioned if the conventional wastewater technology is the best solution for urban areas.

At the Agricultural University of Norway and associated institutes, research utilizing ecologically engineered systems for wastewater treatment is occurring. This effort is multidisciplinary and involves soil and plant scientists, microbiologists, ecologists, economists and engineers.

This paper describes the technology initiated through a national program for natural and ecologically engineered wastewater treatment systems and emphasizes the challenges of system implementation.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 02:40 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA18051 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 02:40:38 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10122; Mon, 13 Mar 1995 02:22:48 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3635 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:15:09
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 2925; Mon, 13 Mar 1995 08:15:08 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:15:03 +0100
Received: by ki.se id AA07248 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:21:02 +0100
Posted-Date: Mon, 13 Mar 1995 02:40:38 -0500
Received-Date: Mon, 13 Mar 1995 02:40:38 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130810.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:21:01 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: W3: Seminar C - PRODUCTIVE WASTEWATER TREATMENT
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2078

Seminar C:

PRODUCTIVE WASTEWATER TREATMENT - Wetland Ecosystem Management

The aim of this seminar is to discuss solutions for wastewater treatment where ecological systems are used and wastewater is seen as a productive resource. Systems as aquacultures, constructed wetlands, riparian alder forests and landfill leachate treatment are examples of such solutions. These ecological systems use the energy of ecological self organization. Therefore, they usually requires little nonrenewable energy input and little maintenance. This also makes the systems economically sound. The systems are productive, can be harvested, and increase species diversity.

Examples of plenary talks that can usefully be referred to in this seminar are the three presentations on results from the aquaculture at Stensund (S3-P12), the presentation by Petter D. Jenssen on different methods used in Norway (S3-P3) and the presentation by Yan Jingsong, which gives an example of how productive wastewater treatment can be used in an industry (S3-P24).

The questions for the seminar are:

How could productive wastewater treatment be promoted in society?

What are the advantages and disadvantages of different systems of productive wastewater treatment?

What are the industrial applications of productive wastewater treatment? (For this question, please refer to relevant topics in the workshop "Industry and Ecotechnics: Industrial Applications of Ecological Engineering")

How could ecological modelling be used in the creation of productive wastewater systems?
(For this question, please refer to relevant topics in the workshop "Computer Technology and Ecotechnics: The Role of Computer-Aided Modelling and Information Technology in Ecological Engineering.")

What combinations of knowledge and what education are needed to promote productive wastewater treatment?
(For this question, please refer to relevant topics in the workshop "Ecotechnics: a System of Education, Research and Development, an Approach within Ecological Engineering.")

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 02:34 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA17911 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 02:34:32 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA09935; Mon, 13 Mar 1995 02:15:16 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3517 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:07:36
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 2760; Mon, 13 Mar 1995 08:07:36 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:07:34 +0100
Received: by ki.se id AA05382 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:13:34 +0100
Posted-Date: Mon, 13 Mar 1995 02:34:32 -0500
Received-Date: Mon, 13 Mar 1995 02:34:32 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130838.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:13:33 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Guidelines / EE-Ecotechnics starts today
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1295

Dear Participants

A few hours ago, you received a "Welcome" message from
the Chairman and the Secretary of the International Symposium on
Ecological Engineering (ECOTECHNICS 95) via the electronic
mailing list "ET-ANN". The "Welcome" message also provided
objectives of the Symposium which I hope you can contribute
actively in the various discussions.

(Pls join ET-ANN if you have not received the Welcome message and get its
file LOG9503). Pls contact me if you have difficulties).

Following this message you will receive

(a) a description of "Seminar C" (ref.nr: W3) which is aimed to discuss
several defined issues. A list of questions is provided. Your active
participation is requested here.

Relevant Internet inputs from this discussion will be presented by the
Seminar Chairperson, Mr. Dag Romell (USA), at 2 face-to-face
discussion sessions on 30th and 31st of March. Then the final conclusions
from this Seminar will be summaried and presented to the general audience
before the closing of the Symposium.

(b) abstracts of papers and posters (ref.nr: S3-P nr)

IMPORTANT:
Pls remember use the reference nrs "S3" or "W3" in the "Subject" line of your e-mail for "Paper & Poster" or "Seminar" discussions respectively.

From: Listowner - Eng-Leong Foo (ECOTEC Coordinator)

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 18:31 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id SAA27155 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 18:31:09 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id RAA04835; Sun, 12 Mar 1995 17:45:48 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 4201 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 23:38:07
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 8729; Sun, 12 Mar 1995 23:38:07 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sun, 12 Mar
          95 23:38:05 +0100
Received: by ki.se id AA11367 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Sun, 12 Mar 1995 23:44:04 +0100
Posted-Date: Sun, 12 Mar 1995 18:31:09 -0500
Received-Date: Sun, 12 Mar 1995 18:31:09 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503122332.A11110-0100000@ki.se>
Date: Sun, 12 Mar 1995 23:44:03 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: INTRO: Kristina Hill (USA)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 840
Status: O

---------- Forwarded message ----------
Date: Sun, 12 Mar 1995 14:57:39 EST
From: Kristina Hill <khill@MIT.EDU>

I'm an ecological landscape planner working at the Massachusetts
Institute of Technology, in the Dept. of Urban Planning. My training is
in ecology and architecture/planning, and my current projects include
many opportunities to apply "ecotechnics" in development work-- in the
US, Thailand, and in eastern Germany. I am interested in keeping track
of new strategies for bioremediation of contaminated land and water, but
also in schemes for alternative sewage treatment and ecological habitat
restoration. I work primarily with civil and environmental engineers
here at MIT, and with ecologists down the street at Harvard University.

Looking forward to an active discussion on the list,

Kristina Hill (khill@mit.edu)

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 18:04 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id SAA25965 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 18:04:27 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id RAA04405; Sun, 12 Mar 1995 17:04:53 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 2936 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 22:57:16
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7094; Sun, 12 Mar 1995 22:56:49 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sun, 12 Mar
          95 22:56:45 +0100
Received: by ki.se id AA00870 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Sun, 12 Mar 1995 23:02:44 +0100
Posted-Date: Sun, 12 Mar 1995 18:04:27 -0500
Received-Date: Sun, 12 Mar 1995 18:04:27 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503122252.A28976-0100000@ki.se>
Date: Sun, 12 Mar 1995 23:02:43 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Wetland Ecological Engineering in China
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 3770
Status: O

pls respond to list

======

From: Prof. Rusong Wang (China), Dept of Systems Ecology, Chinese Academy
of Sciences, Beijing. E-mail: wangrs@bepc2.ihep.ac.cn

Our department has been involved in three wetland engineering
projects since 1980's, all of which locate in the densely populated
coastal area and Yangtze River basin:

1. Wetland ecological engineering in Dongting lakeside region:

Dongting lake was the largest lake in China, which is located in the
middle reach of Yangtze river. Its total area was reduced by 40%
due to inappropriate reclamation of its wetland and waterbody into
mono-agricultural farmland between 1966 and 1976. Since 1980's,
researchers, local governments and farmers have been working on
various types of wetland ecological engineering such as reed-
siviculture engineering, rice-ramie-fish engineering, forage-
fertilizer-fuel(biogas) engineering and poultry-pig-edible fungus-
aquaculture engineering. These projects brought not only a big

economic and social benefit to local people (annual income increase rate is more than 30% since 1988), but also greatly improved the biodiversity, the soil fertility, the function of the local and regional ecosystem.

2. Waste water treatment engineering by wetlands in the coastal area of Tianjin city:

Beijing and Tianjin are the second and third largest industrial cities in China respectively. Water shortage and waste water contamination are the two fatal issues besetting the development of these two cities. Most of the waste waters from the two cities flow down into the Bohai Bay through Tianjin. How to use the large area of wetland along the coastal area to purify and recycle the waste water is a key for sustainable economic and ecological development of the cities.

A national key research project on wetland treatment system was initiated in 1986. Research results show that the final effluent from the experimental reed ecosystem matches the latest standard of rank 2-3 of surface water quality standards issued by the national EPA. (Rank 1 = drinking water; Rank 2 = water for industrial use; Rank 3 = water for agricultural use). The removal ratio exceed 90% for BOD, total nitrogen, suspended solids, and colon bacilli, and nearly 50-80% for phosphorus. Those water contains no heavy metal and other toxic materials are used for irrigation and aquaculture. Results shows that the crop yield increased by 20-80% due to the availability of irrigation water and its nutrients.

Now the impacts of waste water in wetland treatment system on ground water and the control measures for non-degradable toxic pollutants are still being investigated.

3. Agro-forestry-industry and wetland comprehensive ecological engineering in Dafeng coastal area:

Dafeng (a coastal county in east of China) eco-county project has been carried out since 1987. One of its main goals is to set up a new ecologically sound comprehensive production system, which connect the agriculture, husbandry, fishing, forestry, industry and wetland together to realize higher productivity and harmonious ecological relationship. 10 ecological production chains have been set up, including the barley-brewery-fishing-livestock engineering, the aquaculture-agriculture-forestry-wildlife conservation engineering etc., among which the brewery and the fertilizer factory have realized zero-emission within its production complex.

I am interested in developing cooperations with other research institutes abroad for advanced studies to analyse the preformances of these wetlands.

I look forward to hearing from you.

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 17:13 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id RAA23859 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 17:13:55 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id QAA04100; Sun, 12 Mar 1995 16:29:18 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 1562 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 22:21:45
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5357; Sun, 12 Mar 1995 22:21:42 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sun, 12 Mar
          95 22:21:40 +0100
Received: by ki.se id AA21758 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Sun, 12 Mar 1995 22:27:39 +0100
Posted-Date: Sun, 12 Mar 1995 17:13:55 -0500
Received-Date: Sun, 12 Mar 1995 17:13:55 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503122252.A13871-0100000@ki.se>
Date: Sun, 12 Mar 1995 22:27:38 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Index File: "DATABASE OUTPUT" (fwd)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1915
Status: O

Dear Session-3 participants

I will be uploading an index of messages that this list ET-LOKE has
received periodically so that you may keep track of the exchanges over
the period.

As you can see the contents of the "Subject:" line is displayed in the
index; thus a careful choice of keywords for the content(s) of your
message is important.

NOTE: to leave this list at anytime, just send an email to
listserv@searn.sunet.se and write the message -
SIGNOFF ET-LOKE

pls remember -- do NOT send listserv commands to the list address.

I thank you for your cooperation.

Eng-Leong Foo (Listowner)
==========

```
> SEARCH * in et-loke since 01 March 1995
--> Database ET-LOKE, 20 hits.

> index
Item #   Date     Time  Recs   Subject
------   ----     ----  ----   -------
000128 95/03/02 14:31    34   Welcome to ET-LOKE
000129 95/03/02 10:13    30   Intro: Dennis Moerman (Canada)
000130 95/03/02 09:34    38   Intro: Paul DuBowy (USA)
000131 95/03/03 11:02    56   Re: Artificial Wetlands down under
000132 95/03/03 15:35    46   From the Listowner: Support to Participants
000133 95/03/05 21:32    58   INTRO: William McDonough (USA)
000134 95/03/06 11:44    26   Re: INTRO: Richard L Meier
000135 95/03/06 17:03    39   Wetlands mapping
000136 95/03/06 15:38    68   Re: Wetlands mapping
000137 95/03/07 17:19    16   INTRO: CARRIE BOWDEN (USA)
000138 95/03/07 21:22    14   INTRO: Kerry Miller (USA)
000139 95/03/08 16:01    25   INTRO: Margaret McCauley (USA)
000140 95/03/09 18:54    35   Re: INTRO: CARRIE BOWDEN (USA)
000141 95/03/09 13:47    21   Intro: Lyle Rode (Canada)
000142 95/03/09 16:08    29   Intro: Chet Rock (USA)
000143 95/03/09 21:42    25   Wetlands
000144 95/03/10 04:17    21   INTRO: Dick Roop (USA)
000145 95/03/11 23:35    24   Re: INTRO: Margaret McCauley (USA)
000146 95/03/12 08:34    45   Re: food production from Wetlands (fwd)
000147 95/03/12 08:53    20   Re: Wetlands mapping - Mangrove Swamps
```

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 07:16 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id HAA06563 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 07:16:22 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id HAA00376; Sun, 12 Mar 1995 07:07:14 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 1241 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 08:47:16
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 8619; Sun, 12 Mar 1995 08:47:16 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sun, 12 Mar
          95 08:47:14 +0100
Received: by ki.se id AA22601 (5.67a/IDA-1.5 for ET-LOKE@SEARN.SUNET.SE); Sun,
          12 Mar 1995 08:53:13 +0100
Posted-Date: Sun, 12 Mar 1995 07:16:22 -0500
Received-Date: Sun, 12 Mar 1995 07:16:22 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503120804.A22307-0100000@ki.se>
Date: Sun, 12 Mar 1995 08:53:11 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Re: Wetlands mapping - Mangrove Swamps
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
In-Reply-To: <v02110100ab81b02449ca@[128.32.181.95]>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 382
Status: RO

On Mon, 6 Mar 1995, Richard Meier wrote:

> For example, no one has really done a story on the current invasion of the
> mangrove swamps by the prawn farms, where the limits seem to be the
> availability of fishmeal, so Ecuador is gaining ground on SE Asia.

Do mangrove swamps fall under this category and are they also called
"wetlands" ?

From: (Mr) Eng-Leong.Foo@mtc.ki.se

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 07:37 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id HAA06792 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 07:37:19 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id HAA00367; Sun, 12 Mar 1995 07:07:10 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 1091 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 08:28:46
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 8320; Sun, 12 Mar 1995 08:28:46 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sun, 12 Mar
          95 08:28:44 +0100
Received: by ki.se id AA10976 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Sun, 12 Mar 1995 08:34:43 +0100
Posted-Date: Sun, 12 Mar 1995 07:37:19 -0500
Received-Date: Sun, 12 Mar 1995 07:37:19 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503120819.A1478-0100000@ki.se>
Date: Sun, 12 Mar 1995 08:34:42 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Re: food production from Wetlands (fwd)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1846
Status: RO

On Mon, 6 Mar 1995, Richard Meier wrote:

> The wetland villagers ouside of Calcutta have innovated greatly in
> the conversion of urban wastes--sewage, garbage and street sweepings--into
> fish and vegetables to be sold back to Calcutta. It is all virtually
> undocumented, because it is a flourishing cottage industry. Their fish
>have kept the mosquito-borne diseases from afflicting Calcutta since
>Independence.

It is interesting to hear of this flourishing cottage industry of the "wetland villages". On the 8th of March I participated at a Swedish Academy of Sciences' seminar for UNU's Zero Emission initiative in Stockholm where Prof. Wenhua Li (Beijing) presented an outline of an on-going Chinese contribution to the UNU project. It is based on the use of wastes (solid, water and CO2) from beer breweries in an integrated food production system where fish farming is a major focus. China of course has a long tradition in this area. Because of the attention given to WATER conservation, integration of fish production in the use of wetland for wastewater treatment has a rapidly growing interest and importance.

I wish to hear if any participant know of demo wetland projects for

brewery
wastewater.

Yesterday, I also participated in a Biofocus Foundation Seminar on Eco-City, a follow-up of the TV-Dialogue between Beijing and Stockholm last Oct 26th. Prof. Rusong Wang (Beijing) presented a paper on such demo eco-city sites, one of which dealt with such a wetland-brewery wastewater-fish system in a southen county in China. Since he will be in Sweden for another 3 weeks, I will encourage him to provide more information on wetlands in China.

From: (Mr) Eng-Leong.Foo@mtc.ki.se, Director, UNESCO Microbial Resources Center, Karolinska Inst., S17177 Stockholm, Sweden. Fax: 46-8/331547 Phone: +46-8-326508

From owner-et-loke@SEARN.SUNET.SE Sun Mar 12 07:36 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id HAA06780 for <tnaff@SAS.UPENN.EDU>; Sun, 12 Mar 1995 07:36:28 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id HAA00272; Sun, 12 Mar 1995 07:05:54 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8950 for ET-LOKE@SEARN.SUNET.SE; Sun, 12 Mar 1995 05:31:39
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5319; Sun, 12 Mar 1995 05:31:38 +0100
Received: from bos1a.delphi.com by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Sun, 12 Mar 95 05:31:36 +0100
Received: from delphi.com by delphi.com (PMDF V4.3-9 #7804) id
          <01HO10AIZ5DI8ZE6NG@delphi.com>; Sat, 11 Mar 1995 23:35:07 -0500 (EST)

Posted-Date: Sun, 12 Mar 1995 07:36:28 -0500
Received-Date: Sun, 12 Mar 1995 07:36:28 -0500
X-VMS-To: INTERNET"ET-LOKE@SEARN.SUNET.SE"
MIME-version: 1.0
Content-transfer-encoding: 7BIT
Message-ID: <01HO10AIZ5DK8ZE6NG@delphi.com>
Date: Sat, 11 Mar 1995 23:35:07 -0500
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
          <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
          <ET-LOKE@SEARN.SUNET.SE>
From: "Dickinson Roop (LABAT-ANDERSON Inc.)" <ROOP@DELPHI.COM>
Subject: Re: student: urban ecology: INTRO: Marga
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
Content-Length: 1013
Status: RO

Note to Margaret McCauley: Re design and use of wetland systems for water treatment and water quality enhancement: WEFTEC, the annual conference of the Water Envrironment Federation, includes a Symposium on Water Quality and Ecology. Included in this are several sessions on natural systems that deal primarily with constructed wetlands and the use amd value of natural wetlands in enhancing water quality. WEFTEC 1995 will be in Miami in October, and procedings of past conferences are available from the Water Environment Federation, (703) 684-2400, WEF, 601 Wythe Street, Alexandria, VA 22314-1994. (they are, sad to say, NOT on internet)

ROOP@delphi.com
R. Dickinson Roop
PAI Corporation
116 Milan Way
Oak Ridge, TN 37830
(615) 483-0666 ~ fax 481-0003

From owner-et-loke@SEARN.SUNET.SE Thu Mar 9 22:17 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.10/8.2SAS) with ESMTP
id WAA12007 for <tnaff@SAS.UPENN.EDU>; Thu, 9 Mar 1995 22:17:28 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id VAA16975; Thu, 9 Mar 1995 21:44:19 -0500

Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
NJE id 4573 for ET-LOKE@SEARN.SUNET.SE; Fri, 10 Mar 1995 03:37:02
+0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
V1.2a/1.8a) with BSMTP id 1387; Fri, 10 Mar 1995 03:37:01 +0100
Received: from ccshst06.cs.uoguelph.ca by SEARN.SUNET.SE (IBM VM SMTP V2R2)
with TCP; Fri, 10 Mar 95 03:37:00 +0100
Received: from hal2010.nw.uoguelph.ca by ccshst06.cs.uoguelph.ca with SMTP
(1.37.109.14/16.2) id AA183723320; Thu, 9 Mar 1995 21:42:00 -0500
Received: from HAL2010/MAILQ by hal2010.nw.uoguelph.ca (Mercury 1.11); Thu, 9
Mar 95 21:43:14 GMT-5
Received: from MAILQ by HAL2010 (Mercury 1.11); Thu, 9 Mar 95 21:42:54 GMT-5
Posted-Date: Thu, 9 Mar 1995 22:17:28 -0500
Received-Date: Thu, 9 Mar 1995 22:17:28 -0500
Priority: normal
X-Mailer: Pegasus Mail v3.1 (R1a)
Message-ID: <9D195616B2@hal2010.nw.uoguelph.ca>
Date: Thu, 9 Mar 1995 21:42:48 EDT
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
<ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
<ET-LOKE@SEARN.SUNET.SE>
From: "Mohammad Javad Abedini (University of Guelph)"
<ABEDINI@NET2.EOS.UOGUELPH.CA>
Organization: School of Engineering
Subject: Wetlands
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 817
Status: RO

Hi everybody

After reading a number of introduction messages, I found that wetlands mean different things to different people. Is that correct?
Let me tell you what do I mean by wetlands. By wetlands, I mean which parts of the watershed are really producing runoff and which parts are not producing runoff. Within the literature, wetlands have been invariably cited with such terms as: Contributing areas, Partial area hydrology, ...
My final goal is to delineate probelm areas that are important in terms of sediment tranport and other contaminant. Whether that goal is achiveable or not, I have no idea. I found that the technology hasn't progressed far enough to address this problem particulary in terms of spatial and temporal resolution of remotely sensed data. Is that conclusion fair enough?
Thanks
Abedini

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 13:06 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from listmail.sunet.se (listmail.sunet.se [192.36.125.15]) by orion.sa
s.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id NAA07262 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 13:06:31 -0500
Received: from segate.sunet.se (segate.sunet.se [192.36.125.6]) by listmail.sune
t.se (8.6.9/8.6.9) with SMTP id TAA08715; Thu, 30 Mar 1995 19:06:53 +0200
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8356 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 18:56:09
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5704; Thu, 30 Mar 1995 18:56:09 +0200
Received: from suncd.abc.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu,
          30 Mar 95 18:56:06 +0200
Received: from sparc2.abc.se.abc.se by suncd.abc.se (4.1/SMI-4.1) id AA21940;
          Thu, 30 Mar 95 19:00:49 +0200
Received: by sparc2.abc.se.abc.se (4.1/SMI-4.1) id AA19482; Thu, 30 Mar 95
          19:00:38 +0200
Posted-Date: Thu, 30 Mar 1995 13:06:31 -0500
Received-Date: Thu, 30 Mar 1995 13:06:31 -0500
Mime-Version: 1.0
Message-ID: <Pine.SUN.3.91.950330185905.18245E-100000@sparc2>
Date: Thu, 30 Mar 1995 19:00:37 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Carl Etnier <Carl.Etnier@ABC.SE>
Subject: S3-P18 Jenssen and Maehlum
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 3391
Status: RO

Treating Domestic Wastewater and Landfill Leachate In Norway Using Constructed Wetlands

Petter D. Jenssen1 and Trond Maehlum2
1 Dept. of Agricultural Engineering, Agricultural University of Norway, Aas
2 Centre for Soil and Environmental Research, Aas, Norway

Report from Carl Etnier
Carl.Etnier@abc.se

In Norway, it is very cold and 50% of the country is above the timberline. It's great for skiing, but can constructed wetlands (CWs) be used there?

It is important to make sure that CWs function hydraulically during the winter. Modelling was done to test this. If the system is insulated on the sides and with 5 cm of styrofoam on top, it can operate satisfactorily even with 2 weeks of -20 C weather, according to the model.

I. Two CW systems which receive ww from two households each.

First system: Septic tank, a sludge separator, CW with LECA
Second: Septic tank, pretreatment LECA-filled tank, CW with brown, oxidized sand, CW with LECA

LECA studies: up to 4 kg P/m3 absorbed, which is 100% of that applied.

First system: BOD 90% removed, total P 99%, total N 50% after two years.

Second system: After 3 years, BOD ca 90%. Over 50% of N removed, we don't know yet where it goes. Total P almost totally removed. In theory, almost all P should be removed for 20 years. Probably won't happen, but when the system is saturated, LECA can be removed and used as fertilizer.

It is interesting that the simpler first system functions almost as well as the second one. The second system is expected, in the end, to have better N removal.

In the winter, hay is placed on top of the systems and they have never frozen. Purification of COD is not significantly different from summer to winter. The same is true for N-tot and P-tot.

Are the systems oversized? That could explain why both systems function as well and performance does not fall off during the winter.

II. Landfill leachate experiments:
Sedimentation pond, aeration pond, and two subsurface flow wetlands and 1 free water surface wetland.

Main removal of BOD, P-tot, and N-tot is in the aerated pond.

The main affect of the constructed wetland has been to improve visual quality of the effluent.

Conclusions:
CWs are a viable alternative for landfill leachate
CWs can be used during the winter in cold climates
The effect of cold climate upon long term purification performace needs further investigations.

Uelo Mander: Have you measured N removal with radioactive N-15?
A: No. But we are doing lab experiments now to study the processes in more detail.

Q: We have done aerated pond experiments with precipitation in Sweden and found no significant differences in performance summer and winter. The phytoplankton communities were even very similar throughout the year.
A: We have done similar experiments in Norway, at Camphill.

Uelo Mander: We have also found good performance during the winter in Estonia.

Q: How much area is used per person in these wetlands?
A: About 10 m2.

Q: How are you going to release the P in the system?
A: Harvesting is not a good solution. It disturbs the ecosystem too much and only gets 10% of the P. The LECA can be used as fertilizer when saturated, but we don't know its fertilizer value.

Carl Etnier: Can it be used as a fertilizer value if, as the paper this morning reported, it only releases its P at pH <2 or >12?
A: We need to investigate this more.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 18:48 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from listmail.sunet.se (root@listmail.sunet.se [192.36.125.15]) by ori
on.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id SAA09268 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 18:48:46 -0500
Received: from segate.sunet.se (segate.sunet.se [192.36.125.6]) by listmail.sune
t.se (8.6.9/8.6.9) with SMTP id TAA08674; Thu, 30 Mar 1995 19:06:44 +0200
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8255 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 18:54:20
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5600; Thu, 30 Mar 1995 18:54:01 +0200
Received: from suncd.abc.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu,
          30 Mar 95 18:53:58 +0200
Received: from sparc2.abc.se.abc.se by suncd.abc.se (4.1/SMI-4.1) id AA21899;
          Thu, 30 Mar 95 18:58:39 +0200
Received: by sparc2.abc.se.abc.se (4.1/SMI-4.1) id AA19410; Thu, 30 Mar 95
          18:58:27 +0200
Posted-Date: Thu, 30 Mar 1995 18:48:46 -0500
Received-Date: Thu, 30 Mar 1995 18:48:46 -0500
Mime-Version: 1.0
Message-ID: <Pine.SUN.3.91.950330185737.18245C-100000@sparc2>
Date: Thu, 30 Mar 1995 18:58:27 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Carl Etnier <Carl.Etnier@ABC.SE>
Subject: S3-P24 Yan Jingsong et al
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2200

Recovery, Conversion, Reuse and Recycling of Organic Wastewater from
a Pharmaceutical Factory
Yan Jingsong1, Shen Hanting2, Zhang Yanqiu3
1 Nanjing Inst. of Geography and Limnology, Academica Sinica
2 Chairman, Baoyin County People's Congress, Jiangsu
3 Chin University of Mining and Technology

Report from Carl Etnier
Carl.Etnier@abc.se

Wastewater and its contents should be considered as a resource.
Resource recovery requires 3 steps:
1) Recovery of organic matter by means of adjusting pH value, adding
a kind of nonpoisonous coagulant and precipitant.
2) Leather catfish (Clarias leather (?sic)) culture in the groves.
3) A large amount of water hyacinth (Eichhornia crassipes) with some
hydroponic cultivated vegetables planted in rotation in this pond.

Pharmacy wastewater with up to 60,000 ppm BOD treated in a complex
system.

First treated to raise pH value by adding a non-toxic coagulant

produced from animal processing. BOD retention 70-80%.

Much of the importance and charm of this talk is the diagram showing an intricate web of resource usage built on a flow of different wastewaters. There is no time to convert it to ASCII art, I am afraid. Get ahold of any of Prof. Yan's papers--he usually has such a diagram in them.

Fundamental principles:
Holism--Think about all factors concerned in many ecosystem parts.
Harmony--Coordination between ecosystem structure and function, between man and nature, utilization and protection, among production sectors, among groups or individuals, among regions and countries, and among different generations.
Regeneration and Circulation--Many processes and measures of recovery, conversion, reuse and recycling for regeneration and recirculation of material in a limited system.
Suiting local conditions--The details of the design must be based on local conditions, though the fundamental prnciples of ecological engineering are universally applicable. For example, grass carp and silver carp are good food in China and have good market value. In Sweden and the US, no one will eat them and so their value is zero.

Prof. Yan's English is very limited, so there was not much of a correspondence between the questions and his answers.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 12:43 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from listmail.sunet.se (root@listmail.sunet.se [192.36.125.15]) by ori
on.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id MAA04978 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 12:43:42 -0500
Received: from segate.sunet.se (segate.sunet.se [192.36.125.6]) by listmail.sune
t.se (8.6.9/8.6.9) with SMTP id TAA08597; Thu, 30 Mar 1995 19:06:04 +0200
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8164 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 18:53:26
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5509; Thu, 30 Mar 1995 18:53:04 +0200
Received: from suncd.abc.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu,
          30 Mar 95 18:53:01 +0200
Received: from sparc2.abc.se.abc.se by suncd.abc.se (4.1/SMI-4.1) id AA21896;
          Thu, 30 Mar 95 18:57:43 +0200
Received: by sparc2.abc.se.abc.se (4.1/SMI-4.1) id AA19384; Thu, 30 Mar 95
          18:57:28 +0200
Posted-Date: Thu, 30 Mar 1995 12:43:42 -0500
Received-Date: Thu, 30 Mar 1995 12:43:42 -0500
Mime-Version: 1.0
Message-ID: <Pine.SUN.3.91.950330185656.18245B-100000@sparc2>
Date: Thu, 30 Mar 1995 18:57:28 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Carl Etnier <Carl.Etnier@ABC.SE>
Subject: S3-P25 Uelo Mander and Lena Vought
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2422
Status: O

Nitrogen and Phosphorus Removal in Riparian Alder Forests
Uelo Mander and Lena Vought2
1 Department of Geography, University of Tartu, Estonia
2 Limnology Institute, University of Lund, Sweden

Report from Carl Etnier
Carl.Etnier@abc.se

About 200 tree species are able to fix nitrogen with help from actinomyces. Alder (Alnus spp.) is one of them.

Problem: There are contradictory results in nutrient buffering capacity research of riparial alder stands. Alnus rubra has been reported as a nitrogen source by Binkley et al. Knauer and Mander found that riparian A. glutinosa stands are able to remove almost all of the N & P fluxes from adjacent fields.

Negative aspect of Alnus: root nodules of Frankia strains of actinomyces can fix a lot of nitrogen.
Positive: Intensive denitrification in Alnus stands.

Hypothesis 1: N concentration in soil and soil water will increase in older A. glutinosa stands.
Hypothesis 2: From ripararian A. incana stands with significant external nutrient load, nutrient leaching will be higher than in similar stands without external loading.

Case studies from Kristianstad, southern Sweden. Five wetland sites with different aged A. glutinosa stands, from 5-7 years to 56-60 years old. For a comparison, Salix stands in meadows were studied.

Nitrogen in soil water was not influenced at all by the age of the alder stand.

Phosphorus in soil water higher in sedge meadows than in Alnus stands, nor was it influenced by alder stand age.

Soil pH, soil organic matter (ignition test) did not vary much either according to age.

Preliminary data presented on two similar gray alder (A. incana) stands at the bottom of a hill, one receiving polluted water and the other unpolluted. In general, there was much more total N and total P in the stand receiving polluted water.

Conclusions:
- No significant differences in N and P concentrations in soil and soil water between different-aged black alder stands in riparian zone of a mesotrophic lake.
- Significant P leaching was found in riparian sedge meadows in the spring.
- No excess leaching of N and P was found on a heavily loaded A. incana stand.
- Riparian alder forests (A. glutinosa and A. incana) are effective buffers on stream banks and lake shores. However, a regular harvesting stabilizes nutrient budget.

Sven-Aake Vikman: It has been shown that Alnus stops fixing nitrogen when it receives a heavy N solution.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 12:57 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from listmail.sunet.se (root@listmail.sunet.se [192.36.125.15]) by ori
on.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id MAA06308 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 12:57:47 -0500
Received: from segate.sunet.se (segate.sunet.se [192.36.125.6]) by listmail.sune
t.se (8.6.9/8.6.9) with SMTP id TAA08506; Thu, 30 Mar 1995 19:05:20 +0200
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8117 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 18:52:41
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5471; Thu, 30 Mar 1995 18:52:31 +0200
Received: from suncd.abc.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu,
          30 Mar 95 18:52:21 +0200
Received: from sparc2.abc.se.abc.se by suncd.abc.se (4.1/SMI-4.1) id AA21888;
          Thu, 30 Mar 95 18:57:00 +0200
Received: by sparc2.abc.se.abc.se (4.1/SMI-4.1) id AA19352; Thu, 30 Mar 95
          18:56:47 +0200
Posted-Date: Thu, 30 Mar 1995 12:57:47 -0500
Received-Date: Thu, 30 Mar 1995 12:57:47 -0500
Mime-Version: 1.0
Message-ID: <Pine.SUN.3.91.950330185343.18245A-100000@sparc2>
Date: Thu, 30 Mar 1995 18:56:47 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Carl Etnier <Carl.Etnier@ABC.SE>
Subject: Report on Seminar C, Productive Wastewater Treatment
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 9272
Status: O

First meeting. Chair: Dag Romell
Thursday, March 30, 15:00
Report from Carl Etnier

The seminar opened with a reading of the summary that Paul DuBowy posted yesterday, of the Internet discussion so far. Thank you, Paul, for that contribution.

Since the "public outreach" section of the summary had the meatiest questions, discussion began there. Economics dominated as an important factor. Everyone agreed that the conventional economics of ecological engineering needs to be well understood and favorable.

Piotr Kowalik began by showing a chart comparing cost efficiency for conventional vs. root zone systems in German for N removal. At a smaller scale, say 1000 pe or less, the costs for conventional treatment soared compared to ecological systems.

Petter Jenssen says that most constructed wetlands have a hard time meeting phosphorus requirements. If the same cost comparison were done for P, there would be a much more favorable result for

conventional systems.

Staffan Holmgren, a Swede who has done much work in India and Vietnam, commented on the wastewater systems in Hanoi and Calcutta as models to study, where production of fish and (in Hanoi) rice are combined with thorough water purification. Where wastewater treatment actually produces something, it becomes very attractive. Eighty to ninety percent of fish in Vietnam are grown on sewage water. Peter Edwards at the Asian Institute of Technology in Bangkok has published on Hanoi. D. Ghosh has published on the Calcutta wetlands, amongst other places in Ambio and in the proceedings of the First International Conference on Ecological Engineering for Wastewater Treatment. (Contact me for more info on the proceedings at Carl.Etnier@abc.se)

Nearer to Sweden, Kaliningrad and Munich were mentioned as cities which have systems similar to Hanoi's.

Gunnar Noren, director of the NGO Coalition Clean Baltic, said that it is very important to economically compare conventional and ecologically engineered systems on a parameter basis: cost per unit BOD, P, N, etc removed. Erik Kaerrman would like to see such analyses include the benefit of recirculation of nutrients, for example how much is gained by replacing chemical fertilizers with urine.

Piotr Kowalik described two ways of handling money for wastewater treatment in Poland. One is the Rolls Royce approach, which involves buying fancy expensive equipment. The Lemna, Inc. systems are in this category. Another is to invest in the simplest technology to do the job, a technology that is labor intensive, not capital intensive. This has a large effect on the economic structure of the community.

Petter Jenssen said that economics is especially important for a system like constructed wetlands, which do not fit into conventional entrepreneurial categories. For example, a small Norwegian company which invents a gadget can get 5 million Norwegian crowns (NOK), about US$800,000, from the government to develop it. His department has a hard time getting 3 million NOK to evaluate constructed wetlands for the entire country.

Norwegian thinking is still locked into prescribing city solutions for the countryside. Huge investments are made in pipelines for transporting the sewage, instead of making decentralized treatment plants. Small sewage systems have no requirements for emissions, so the water is often discharged untreated into a fjord. The worst example he knew of was a system of pipes which cost about $7500 per kilo P--just to take untreated wastewater to the sea!

Piotr Kowalik talked about the importance of looking at whole systems. He told the story of a Polish wastewater treatment plant (WWTP) that was built to avoid pouring sewage water into a lake. The plant discharged downstream of the lake in a river, and actually made water pollution problems worse. Stormwater was part of the sewage received, and most of that ran right by the WWTP and into the river, resulting in pulses of very polluted water in the river. This river is the drinking water source for Gdansk. It would have been better,

he thinks, to have continue using the lake as a buffer than to sacrifice the river quality.

Lasse Forsberg and many others tied together the thoughts of looking at whole systems and economics by emphasizing the importance of treating wastewater as a resource. The valuable components of wastewater must be used. For example, Sweden is converting much of its farm land to Salix (willow) energy coppices. Many of these have been fertilized, but some areas are using municipal WWTP effluent instead of fertilizer. This has even allowed them to reduce the amount of chemical precipitation for P--the P is needed in the effluent for the Salix.

Yan Jingsong extended the points he had made in his talk about the ingenuity of the Chines in using and reusing waste resources. Water hyacinth grown on wastewater is processed into food and a good fuel for biogas generation by passing it through a pig's stomach--the hyacinth becomes both pig and pig manure. He was amazed by his travels through the U.S. to see that wetlands were not harvested. That would never happen in China.

Dag Romell (a Swede living in the US) says the US has a long tradition of massive waste and is rapidly going downhill. But people will not wake up until things get a lot worse.

Other systems of wastewater reuse were taken up. Urine separating toilets are much discussed and sometimes used in Sweden now. Since urine contains most of the P and N in human waste products, removing it from the waste stream gives dramatic results. Your faithful secretary described a project Stensund Ecological Center is trying to get funding for. It would install 1500 urine separating toilets, mostly in existing housing, and use the urine to greatly increase, perhaps double, the yield of grain at a local organic farm.

Erik Kaerrman emphasized that urine-separating toilets are most important in the home. His results of tests on his own urine show that the concentration of nutrients is very high in his first urination of the morning, and a total of 80% of his phosphorus is in the urine he passes at home, if he works 8-5 each day.

Petter Jenssen is working on a project to bring concentrated blackwater from a new apartment building in Oslo out to the countryside, where much grain is grown with little input of anything but chemical fertilizer. This will both reduce the wastewater problem and help build up the organic matter content of the soil.

The question of suitable plants, begun on Internet, was referred to the people here. Petter Jenssen says that the most suitable plant survives if many species are thrown in, and Phragmites seems to work terribly well. (Note Piotr Kowalik's comments about Agrostis stolonifera as a possible alternative to reeds, in his talk.)

Tina Carlsen's questions about wetlands for groundwater remediation were raised. Piotr Kowalik thought that a Phragmites wetland with vertical flow sand filters, receiving waters in pulses, would work well. We did not discuss that in the detail it deserved. Juerg

Staudenmann from Switzerland emphasized source reduction--it is fine to remediate water but one should look at the source of the pollution and try to stop that. (I hope LLNL has already done that--what do you think, Tina?)

Someone on the net asked about a study correlating particle size gradation with nutrient removal efficiency in wetlands. Uelo Mander said Gunther Geller in Munich has compared glacial till with normal soils and found no difference in treatment efficiency. Piotr Kowalik places a premium on hydraulic conductivity--he has seen too many clogged systems--and uses as coarse a material as possible. Petter Jenssen says that surface area and surface reactivity are often more important than grain size. LECA can be very coarse, for example, but it has a huge surface area and lots of Fe and Al for taking up P.

The qustion conference secretary Andreas Englund asked us to consider about types of education for ecological engineering stimuated a good deal of discussion. Piotr Kowelik described a course done in Poland a couple years ago, in cooperation with Denmark. The chose a number of WWTP designers around 40 years old and gave them a series of lectures and homework assignments, with several months between the lecture times, on constructed wetlands. The course culminated with two weeks travelling in Denmark and visiting sites. One year after the course, most of the participants had in effect started a new life. They were very motivated in a new way to try their creativity out on these new types of facilities. Kowelik thinks it is important not just to train 20 year olds and wait 20 years until they get some influence, but also to retrain the people who now are influential.

Juerg Staudenmann would like to see the education begin in kindergarten, with much emphasis on getting a feel for nature. Dag Romell wants to see creative thinking promoted. Lasse Forsberg wants more interdisciplinary work between biologists and technicians.

There was more said, but that ought to be enough to get discussion going some more. Please get all your comments or questions you want to the final seminar session out to us by Friday at 10:30 Central European Summer Time.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 11:02 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from listmail.sunet.se (root@listmail.sunet.se [192.36.125.15]) by ori
on.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id LAA25370; Thu, 30 Mar 1995 11:02:39 -0500
Received: from segate.sunet.se (segate.sunet.se [192.36.125.6]) by listmail.sune
t.se (8.6.9/8.6.9) with SMTP id RAA04617; Thu, 30 Mar 1995 17:27:27 +0200
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 1478 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 17:16:30
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 8089; Thu, 30 Mar 1995 17:16:30 +0200
Received: from mail.tamu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Thu, 30 Mar 95 17:16:23 +0200
Received: from orca.tamu.edu (ORCA.TAMU.EDU [128.194.193.1]) by mail.tamu.edu
          (8.6.10/8.6.10) with SMTP id JAA10286 for <ET-LOKE@SEARN.SUNET.SE>;
          Thu, 30 Mar 1995 09:20:06 -0600
Received: by orca.tamu.edu (4.1/SMI-4.1) id AA18398; Thu, 30 Mar 95 09:20:05 CST

Posted-Date: Thu, 30 Mar 1995 11:02:39 -0500
Received-Date: Thu, 30 Mar 1995 11:02:39 -0500
Message-ID: <9503301520.AA18398@orca.tamu.edu>
Date: Thu, 30 Mar 1995 09:20:05 CST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Paul DuBowy <dubowy@ORCA.TAMU.EDU>
Subject: municipal systems, stormwater, and plants
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 1639
Status: O

Responding to several different recent postings:

Regarding municipal systems: here in the US, several large-scale systems (Beaumont, Texas; Arcata, California; Orlando, Florida) and many smaller systems are working very well. Regarding stormwater, Beaumont's normal daily flow is 30 million gallons per day; however, Beaumont also receives 60 inches (1.5 m) of rain per year. Consequently, its peak flow is more than 80 mgpd. Obviously, that reduces retention time by a factor of 2.5. Fortunately, the Beaumont system is so large that it can handle the excess load.

Regarding aquatic plants: nobody is advocating that we use exotic plants. However, I repeat my original point that many plants will not survive high ammonia conditions. Moreover, if you are familiar with the intermediate disturbance hypothesis, you know that diversity is enhanced at moderate levels of disturbance. With constant (high) conditions, one might expect only certain plants to survive and diversity to decline. Rather, why not consider a _series_ of wetland cells. Water chemistry will change due to ammonification, nitrification, adsorption, etc. among cells. Moreover, you can design (or set, if you are using variable control structures) different cells

to different water depths. Treatment may also be enhanced due to different depths as well. This would provide you with (habitat) diversity by providing a mosaic of wetland types. We are currently doing exactly this at Beaumont.

Paul J. DuBowy
Associate Professor
p-dubowy@tamu.edu
Dept Wildlife & Fisheries Sciences
Texas A&M University
College Station, TX 77843-2258
(409) 845-5765

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 17:21 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id RAA02088 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 17:21:12 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id LAA03110; Thu, 30 Mar 1995 11:07:03 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8644 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 16:23:07
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 4273; Thu, 30 Mar 1995 16:23:06 +0200
Received: from mtu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30
          Mar 95 16:23:02 +0200
Received: from biosrv1.bio.mtu.edu (biosrv1.bio.mtu.edu [141.219.40.30]) by
          mtu.edu (8.6.10/8.6.10) with ESMTP id JAA28603 for
          <ET-LOKE@SEARN.SUNET.SE>; Thu, 30 Mar 1995 09:26:38 -0500
Received: (from sjarnagi@localhost) by biosrv1.bio.mtu.edu (8.6.10/MTU-R1.4) id
          JAA08909 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 09:25:55 -0500
Posted-Date: Thu, 30 Mar 1995 17:21:12 -0500
Received-Date: Thu, 30 Mar 1995 17:21:12 -0500
X-Mailer: ELM [version 2.3 PL11]
Message-ID: <199503301425.JAA08909@biosrv1.bio.mtu.edu>
Date: Thu, 30 Mar 1995 09:25:55 EST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: "S. Taylor Jarnagin" <sjarnagi@MTU.EDU>
Subject: Re: S3 questions from Gerard Voos
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
In-Reply-To: <0098E168D3CD1160.2040252F@srel.edu>; from "GERARD VOOS" at Mar
              29, 95 2:21 pm
Content-Type: text
Content-Length: 1070

On March 29th, Gerard Voos asked " Is it conceivable that wetlands (or other ecological treatment options) can augment our central treatment facilities? If so, how?" Earlier in his posting he had mentioned the common problem experienced by many municipal wastewater treatment facilities due to fluctuations of flow due to the routing of urban storm water runoff to the water treatment facility.

The City of Bemidji, Minnesota, USA; the Lake Bemidji Watershed District; and Bemidji State University have constructed a wetland combined with a sand/peat filter to intercept urban storm water runnof and remove metals and nutrients prior to the introduction of that runoff into the lake. It seems to me that constructed wetlands offer an excellent means of diverting storm waters away from municipal wastewater treatment facilities and helping to equalize the flow input to those facilities.

Taylor Jarnagin
203 MEEM
Dept. of Biological Sciences

Michigan Technological University
1400 Townsend Dr.
Houghton MI 49931-1295
(906) 487-1295
E-address: sjarnagi@mtu.edu

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 15:21 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA20857 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 15:21:49 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA02503; Thu, 30 Mar 1995 10:51:06 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 6227 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 15:23:27
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 1220; Thu, 30 Mar 1995 15:22:42 +0200
Received: from mercury.forestry.umn.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2)
          with TCP; Thu, 30 Mar 95 15:22:39 +0200
Received: from jperry (FR134.forestry.umn.edu [128.101.70.134]) by
          mercury.forestry.umn.edu (8.6.10/8.6.10) with SMTP id HAA02759; Thu,
          30 Mar 1995 07:24:25 -0600
Posted-Date: Thu, 30 Mar 1995 15:21:49 -0500
Received-Date: Thu, 3 Mar 1995 15:21:49 -0500
X-Sender: jperry@forestry.umn.edu
X-Mailer: Windows Eudora Version 2.0.3
Mime-Version: 1.0
Message-ID: <199503301324.HAA02759@mercury.forestry.umn.edu>
Date: Thu, 30 Mar 1995 07:24:25 -0600
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Jim Perry <jperry@MERCURY.FORESTRY.UMN.EDU>
Subject: Water Quality Interviews
Comments: To: ecolog-l@umdd.umd.edu, eehd-L@yalevm.ycc.yale.edu,
          meh20-L@taunivm.tau.ac.il, envst-l@brownvm.brown.edu,
          devel-l@american.edu, ecosysh@uoguelph.ca, water-on-line@ucdavis.edu,
          fish-eco@searn.sunet.se, siin-l@unb.ca, slovak-l@ubvm.cc.buffalo.edu,
          one-l@ubvm.cc.buffalo.edu, envcee-l@fs2.bp.rec.hu,
          ecol-econ@csf.colorado.edu, rw-env@suvm.acs.syr.edu,
          envinf-l@nic.surfnet.nl, etp-l@poniecki.haas.Berkeley.EDU
Comments: cc: elenaP@wri.org, vagacova@acadistr.sk
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text/plain; charset="us-ascii"
Content-Length: 1286

(Re-post; please reply AGAIN) I am teaching two upper level classes in water quality (i.e., "Water Quality and Natural Resource Management" and "Internatiomal Water Quality" to advanced undergraduates and graduate students. Each student will write two 3-5 page case studies, a descriptive one and a decision analysis. The student will read background material, conduct an interview and prepare the case.

I would like to identify people willing to be interviewd via e-mail. This will be a one-on-one interaction, with no relationship to the list. You would have no more than three exchanges with the student. People in any field of water quality (e.g., ecology, economics, hydrology, social scientists) would be fine.

If you are willing to be interviewed, I need a statement of your interests and a citation or two for the student to read. The interviews will occur in April and May.

I DID post this request earlier, received more than 35 offers and lost them all due a computer crash. If you responded earlier, PLEASE respond again. I (and the students) am still interested but your address has been lost.

Thank you very much.
Jim Perry

Professor, Water Quality
Deputy Director, Environmental Training Project
for Central and Eastern Europe

University of Minnesota

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 11:05 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id LAA25680 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 11:05:11 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA01911; Thu, 30 Mar 1995 10:33:12 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3396 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 14:21:29
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7674; Thu, 30 Mar 1995 14:21:19 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 14:21:18 +0200
Received: by ki.se id AA00650 (5.67a/IDA-1.5); Thu, 30 Mar 1995 14:27:28 +0200
Posted-Date: Thu, 30 Mar 1995 11:05:11 -0500
Received-Date: Thu, 30 Mar 1995 11:05:11 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503301418.A14929-0100000@ki.se>
Date: Thu, 30 Mar 1995 14:27:27 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Environmental Engin. and related problems
Comments: cc: "ECOTEC-ECOTECHNICS95: S4/W4" <et-oden@searn.sunet.se>
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1237
Status: O

Following is a contribution written by Dr. Debashis Chatterjee from the
Oestersund conference

Present Projects:
1. Nutrient Recycling and Crop Production by Utilizing Ecologically
Balanced System

Objective
Step I: Characterization of waste
Step II: Evaluation of resources such as nutrients (N, P, K)
Step III: Recycling of resources by suitable ecologically balanced
system- *living bio-filter*- soil-plant system
Step IV: Investigate related influencing factors such as climatic
condition, method of irrigation, practice and management
Step V: Economics vis-a-vis viability of the technique

2. Ecological Modelling of River Water Quality
Objective
Step I: Characterization of river water quality
Step II: Selection of the water quality parameters
Step III: Study of the model with the bank
Step IV: Find out the status of the parameters from the model

Step V: Verification and restructuring of the model with the help of new problems

Dr. D. Chatterjee
Head of Analytical Division
Dept. of Chemistry
Univ. of Kalyani
Kalyani, Nadia, Pm-741235
WEst-Bengal, INDIA

From: (Mr) Eng-Leong.Foo@mtc.ki.se, Director, UNESCO Microbial Resources Center, Karolinska Inst., S17177 Stockholm, Sweden. Fax: 46-8/331547
Phone: +46-8-326508

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 15:19 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA20679 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 15:19:43 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA01674; Thu, 30 Mar 1995 10:27:17 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3182 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 13:41:03
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7343; Thu, 30 Mar 1995 13:41:03 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 13:41:01 +0200
Received: by ki.se id AA21441 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 13:47:11 +0200
Posted-Date: Thu, 30 Mar 1995 15:19:43 -0500
Received-Date: Thu, 30 Mar 1995 15:19:43 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503301345.A14929-0100000@ki.se>
Date: Thu, 30 Mar 1995 13:47:10 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
             <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
             <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P20: LECA as reactive filter...
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2408

S3-P20:
Light Expanded Clay Aggregates (LECA) as Reactive Filter Media in
Constructed Wetlands

Lena Johansson, Gunno Renman, and Hans Carlstroem
Divisision of Land and Water Resources, Royal Institute of
Technology, Stockholm

LECA is postglacial clay that has been made into burned, light
popcorn-like material. Very porous and floats in water.

Main components: oxides of Si, Al, Fe are the most important
components, but also oxides of Ca, Mg, Mn, K, and Na are present.

Norwegian results: 1 m3 LECA can remove 4 kg P/yr from water.

We carried out lab experiments on P absorption in relation to pH,
temperature, and concentration of phosphate solution.

Grain size of LECA used: 0-4 mm

Table comparing physical properties of LECA and sand/gravel. LECA
has--

specific weight: less
specific surface: 4 orders of magnitude more
porosity: twice as high
field capacity: comparable
hydraulic conductivity: comparable

Temperature and pH: Higher absorption at pH 6.4 than 7.7. At pH 7.7, higher absorption at 25 C than 9 C. At pH 6.4, lower absorption at 25 C than 9 C.

Experiment was only 3 weeks long. More information is needed about the duration of the treatment efficiency and more about the physical and chemical characteristics. We also hope to optimize the retention of phosphorus and possibly also nitrogen.

Q: What does one do with the saturated LECA?
A: It is used as a fertilizer.

Q: How tightly bound is the P? Can plant roots extract it?
A: Probably not. We studied that the P naturally bound is released at pH <2 and >12.

Johannes Heeb: Some of us have worried about the energy costs of making LECA.
A: I don't know much about it. They are made by heating the clay to 1200 C, so that takes some energy.

Bjoern Guterstam: Do you know anything about the role of microbes on LECA?
A: We are just starting experiments that will take that up.

Lars-Erik Forsberg: How the P is bound to the LECA is very interesting, from a recycling standpoint. It needs to be possible to release the bound N.

Bill Mitsch: For a constructed wetland, the ecological economics have to be advantageous also. This means that the energy question is very important.

A: We are not recommending the material. We are bit suspicious of it. It is being sold a lot lately for P removal, but we don't know if it is good. And 4 kg P/m3 retention is very low, when one considers its enormous specific area.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 15:23 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA21009 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 15:23:26 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA01572; Thu, 30 Mar 1995 10:22:36 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3149 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 13:38:16
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7288; Thu, 30 Mar 1995 13:38:16 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 13:38:14 +0200
Received: by ki.se id AA20823 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 13:44:24 +0200
Posted-Date: Thu, 30 Mar 1995 15:23:26 -0500
Received-Date: Thu, 30 Mar 1995 15:23:26 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503301333.A14929-0100000@ki.se>
Date: Thu, 30 Mar 1995 13:44:23 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P26: Ecotechnological measures in landscape
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2228

S3-P26
Where to Apply Ecotechnological Measures in the Landscape? A Case Study Within a Watershed Near Stockholm

Amanda Hoegelin and Gunno Renman
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm

Watersheds near Arlanda airport, north of Stockholm. Water has been monitored for 3 years. Four municipalities share this area; it is largely rural.

About 6 tons phosphorus discharged from watershed to Baltic Sea every year, and 137 tons nitrogen also discharged. This is combination of anthropogenic and natural loads. The goal was to reduce the N discharge by 50% from 1990 to 1995. Now, in 1995, it is the same as 1990.

Sources of the total load:

Anthropogenic diffuse leakage	Dominated in many places
Sewage treatment plants	Small contribution
Septic systems	Also a significant source.
Cattle	Small contribution

Lake deposition	Small contribution
Urban stormwater	Small contribution
Background	Ca 15% of the total discharges

Diffuse leakage was very highly correlated with the percentage of the area which is open (nonforested).

Area had originally 1000 ha of wetlands, but now there is nothing. The propose that at least 150 ha be restored and that river flow be diverted through the wetlands.

Urban stormwater doesn't contribute much in general to the river, but at certain spots it does. In one village, they are working to divert stormwater to two systems. The first receives water during the first hour of rainfall, the dirtiest water, and the other takes the rest. Second system has sedimentation ponds.

Q: Have you done any work on soil structure?
A: No, we are not looking at this level of detail. Instead, we look at the landscape more wholistically.

Q: Does this area take the urea from Arlanda airport?
A: No, that goes elsewhere. They are also treating onsite.

Q: How will you harvest the nutrients?
A: We have thought about it and want to do it. (No specifics given.)

Q: Are you calculating mass balance equations for the area?
A: Yes, it is necessary.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 10:40 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id KAA23225 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 10:40:48 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA01058; Thu, 30 Mar 1995 10:13:40 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 0494 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 10:42:58
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3650; Thu, 30 Mar 1995 10:42:57 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 10:42:55 +0200
Received: by ki.se id AA12647 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 10:49:05 +0200
Posted-Date: Thu, 30 Mar 1995 10:40:48 -0500
Received-Date: Thu, 30 Mar 1995 10:40:48 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503301012.A10087-0100000@ki.se>
Date: Thu, 30 Mar 1995 10:49:04 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 3566
Status: O

---------- Forwarded message ----------
Date: 29 Mar 1995 20:56:41 -0800
From: "Tina Carlsen" <Tina.Carlsen@quickmail.llnl.gov>
Subject: Re: plant selection
To: "ECOTEC/ECOTECHNICS95: S3/W3 - " <ET-LOKE@SEARN.SUNET.SE>
X-Mailer: Mail*Link SMTP-QM 3.0.2

        Reply to: RE>>plant selection

I've been following this discussion about plant selection with some interest, and thought I'd like to add a point or two. First I should introduce myself. My name is Tina Carlsen. I am an environmental scientist with Lawrence Livermore National Laboratory. My background is in environmental chemistry and plant ecology, and I am currently completing a PhD in ecology at the University of California at Davis. I am currently working on a ground water remediation project. I have no experience with constructed wetlands, however, we are considering a constructed wetland to remove nitrates in the ground water after the water has been pumped to the surface and organic solvents have been removed through air stripping/granular activated carbon treatment. As we will be starting with nitrate, it seems to me that the selection of plant species may be more subtle. Our goal is to remove the nitrates through denitrification in the anoxic soils. However, our ground water is essentially devoid of organic carbon, and thus the decay of plants will be needed to

provide the necessary carbon for denitrification. But mineralization of the organic nitrogen will produce some ammonia, and thus some nitrification will be necessary. Does anyone know if any research has been done on the best plant or combination of plants for this kind of system? Perhaps using a plant-based system is not the best approach. It would seem to me that some agricultural runoff which could be primarily nitrate would have the same issues.

As an aside, in the U.S., many sites with ground water contamination have installed "pump and treat" systems. Although the efficacy of such systems is in question, for mass removal/plume control such treatment appears appropriate. My question to this group is, how best can constructed wetlands be used as a "sink" for treated ground water? Does it make sense to create wetlands for their various functional values with the possiblity that once the ground water is "cleaned up", the water source will be turned off? In the U. S., many managers of ground water cleanup programs are leary of creating "jurisdictional" wetlands, and worried they may later be required to "deal with" endangered species. I personally know of some instances where hydric vegetation which began to establish in discharge sites was intentionally wiped out to avoid such questions. How can we overcome these concerns?

Tina

Date: 3/29/95 3:12 PM
To: Tina Carlsen
From: ECOTEC/ECOTECHNICS95: S3/W3 -
A couple of points about the selection of plants for constructed wetland treatment systems...

Phragmites may be great for surface area, but it is considered an invasive pest
in the United States by many individuals (several in the US Fish & Wildlife Service included). Its use in created wetlands could intensify problems associated with it.

I agree with Mitchell. Oxygen transfer may be the primary consideration for the
selection of plant species. Particle size gradation would likely be as important a concern when considering surface area. Has anyone done a study correlating the effects of particle size gradation on nutrient removal (nitrogen in particular)?

And always remember Kudzu and Honeysuckle when dealing with exotics...

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 10:27 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id KAA21914 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 10:27:15 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA00594; Thu, 30 Mar 1995 10:07:25 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7821 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 09:17:09
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 0330; Thu, 30 Mar 1995 09:17:05 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 09:17:03 +0200
Received: by ki.se id AA23937 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 09:23:13 +0200
Posted-Date: Thu, 30 Mar 1995 10:27:15 -0500
Received-Date: Thu, 30 Mar 1995 10:27:15 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503300909.A20884-0100000@ki.se>
Date: Thu, 30 Mar 1995 09:23:12 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P3: wastewater treatment in Norway
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 450
Status: O

Report from Oestersund conference, Wednesday afternoon, March 29
Paper session 1A, Productive Wastewater Treatment: Aquaculture, the Duckweed
System and Modelling
>From Carl Etnier, with help from Ross Campbell

Due to personal reasons, Petter Jenssen was unable to come today
 and participate in Paper session 1A. As a result, the paper Natural Systems
Technology: An Ecological Approach to Wastewater Treatment in Norway
(S3-P3) was cancelled.]

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 10:28 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id KAA22054 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 10:28:20 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA00586; Thu, 30 Mar 1995 10:07:15 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7757 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 09:14:52
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 0239; Thu, 30 Mar 1995 09:14:52 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 09:14:49 +0200
Received: by ki.se id AA23324 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 09:20:59 +0200
Posted-Date: Thu, 30 Mar 1995 10:28:20 -0500
Received-Date: Thu, 30 Mar 1995 10:28:20 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503300908.A20884-0100000@ki.se>
Date: Thu, 30 Mar 1995 09:20:59 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P5: sand and soil filters
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 3050
Status: O

Report from Oestersund conference, Wednesday afternoon, March 29
Paper session 1A, Productive Wastewater Treatment: Aquaculture, the Duckweed
System and Modelling
>From Carl Etnier, with help from Ross Campbell

S3-P5:
Jaana Aaltonen and Per Andersson, Royal Institute of Technology,
Stockholm, Sweden.
Durability and Maintenance of Ecotechnological Wastewater Systems.

Types of systems studied: sand/soil filters, infiltration in native
soils.

Sixty seven systems that they got information on from regulatory
authorities were studied for seasonal variation in and long-term
durability of N and P purification.

Seasonal differences
Summer May-September for N
Summer 44%, winter 18% N reduction
Summer May-December for P (Didn't explain why they chose different
periods)

Summer 60%, winter 38% P reduction

Purification efficiency with respect to age.
Summer, N. Lots of scatter, but general downward trend from year 2 to year 7. If it continues, in year 13 the plant will be a source of N. r2=.30 There are no recorded cases of a plant that is a source of N, but measurements of N have not been taken very long.
N reduction in winter. r2= .07.
P retention for the whole year. Scattered all over the place. Very weak declining trend over 18 years, but r2=2%

Only 15% of authorities check these facilities 3 or more times a year. 33% never check. Only 7% check levels at least 5 times annually. 50-1000 persons handled by them, so they are not insignificant.

Reasons for closing down: clogging up, due to bad planning (undersized) and construction. Ecotechnical solutions are not self-regulating but should be somewhat controlled and/or overseen. Only one plant of 16 which were closed down were shut due to poor purification.

One comment from the audience that it is an environmental crime not to measure in 1/3 of cases.

Q: Can the soil type and biological components have an influence?
A: Probably. We have only looked at season and age. Soil type, climate, area, and many other factors should be considered in a multiple regression analysis.

Q: Are these data politically influenced? I can find thousands of examples of better wetlands. (Uelo Mander, wetlands researcher from Estonia.)
A: These are just soil filter beds. But some of the authorities suspect that too much retention is shown in these figures, i.e. they are too optimistic.

Also from the questions:
P absorbed by the soil does not leak out in solution, but rather excess P does not get absorbed. Saturation is of course a problem. Also P release as a result of denitrification.

Sweden allows these plants with systems that would be prohibited in other countries. This is impossible in densely populated areas.

differences in measurement techniques make comparison from system to system--we did not use our own data but collected it.

Can gains be made by better maintenance? Yes. Clogging could be minimized for example. This should be emphasized in conjunction with age-of-system critique.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 30 10:39 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id KAA23125 for <tnaff@SAS.UPENN.EDU>; Thu, 30 Mar 1995 10:39:57 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA00580; Thu, 30 Mar 1995 10:07:06 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7726 for ET-LOKE@SEARN.SUNET.SE; Thu, 30 Mar 1995 09:12:49
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 0191; Thu, 30 Mar 1995 09:12:48 +0200
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 30 Mar
          95 09:12:46 +0200
Received: by ki.se id AA22881 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Thu, 30 Mar 1995 09:18:55 +0200
Posted-Date: Thu, 30 Mar 1995 10:39:57 -0500
Received-Date: Thu, 30 Mar 1995 10:39:57 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503300905.A20884-0100000@ki.se>
Date: Thu, 30 Mar 1995 09:18:55 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P4:swedish wastewater systems
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2970
Status: O

Report from Oestersund conference, Wednesday afternoon, March 29
Paper session 1A, Productive Wastewater Treatment: Aquaculture, the Duckweed
System and Modelling
>From Carl Etnier, with help from Ross Campbell

S3-P4:
Erik Kaerrmann, Chalmers Univeristy of Technology, Gothenburg, Sweden.
Evaluation of Various Wastewater Systems, Methods, and Applications

Case studies of 6 Swedish wastewater systems, evaluated with respect
to

- Losses of N & P to recipient (%)
- recycling of phosphorus (%)
- economics (Sw crowns (SEK)/person/year)
- land surface (m2/person)
- energy (kWh/person/year)

Case studies, from 48 pe to 550000:
48, 150, 1500, 5800, 20000, and 550000, respectively.

Different treatment systems, from standard bio & chem to ponds and wetlands

550000	bio & chem treatment, no N reduction. Discharge to sea.
20000	bio & chem treatment, N reduction. Discharge to sea
5800	bio & chem treatment, N reduction. Discharge to sea
1500	stabilization and storage ponds. No discharge to recipient; the water is used for irrigation instead
150	constructed wetland. Discharge to a river. Recycling through reused soil.
48	Earth closets, constructed wetland plus sand filter for graywater. Compost, reused soil recycled.

20000	Too high cadmium, all sludge to a landfill. 550000 9% of P in sludge recycled.
1500	All P recycled, no N & P losses.
48	All P recycled, no N & P losses.

Treatment andtransport costs SEK/pers/yr

550000	680
20000	460
5800	NA
1500	380
150	NA (>1280). Investment costs hi because of short lifetime.
48	3080. One earth closet / house--hi investment

Makes no claims to being comprehensive. Would like to also evaluate urine separating systems, very small conventional systems.

Q: Have you taken into account possible income from the value of fertilizer produced.
A: No. That would be very important to do. Also other sorts of income should be considered: biogas, energy from heat pumps, etc.

Q: Can you make any generalizations from these, or do they reflect local conditions too much?
A: It is difficult to draw much in the way of general conclusions. Further study is needed.

A comment was made that any comparison between conventional and alternative wastewater treatment is unfair, since so much more energy and time and money has gone into developing conventional systems.

Carl Etnier's comment: It is important anyway to start making these comparisons. This is the beginning of what needs to be a much more widespread database.

Other conclusions: N removal--this is the expensive portion of conventional systems
Alternative systems, like the wastewater irrigation system on Gotland, sometimes meet other needs such as lack of water and that particular benefit has its own value.

From owner-et-loke@SEARN.SUNET.SE Thu Mar 23 01:33 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id BAA20973 for <tnaff@SAS.UPENN.EDU>; Thu, 23 Mar 1995 01:33:44 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id AAA06163; Thu, 23 Mar 1995 00:54:25 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3862 for ET-LOKE@SEARN.SUNET.SE; Wed, 22 Mar 1995 18:44:01
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 8101; Wed, 22 Mar 1995 18:44:01 +0100
Received: from ced.berkeley.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Wed, 22 Mar 95 18:43:58 +0100
Received: from [128.32.181.91] (wur1mac11.ced.berkeley.edu) by ced.berkeley.edu
          (4.1/SMI-4.1) id AA09182; Wed, 22 Mar 95 09:47:40 PST
Posted-Date: Thu, 23 Mar 1995 01:33:44 -0500
Received-Date: Thu, 23 Mar 1995 01:33:44 -0500
X-Sender: meier@chabot.ced.berkeley.edu
Mime-Version: 1.0
Message-ID: <v02110101ab967ae7009d@[128.32.181.91]>
Date: Wed, 22 Mar 1995 09:47:39 PST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Richard Meier <meier@CED.BERKELEY.EDU>
Subject: Re: Integrated waste treatment
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text/plain; charset="us-ascii"
Content-Length: 2140

>GERARD VOOS (@ SREL) <voos@srel.edu> wrote:
>
>>How could productive wastewater treatment be promoted in
>>society? What are the principal properties of these systems (as
>>compared to conventional wastewater treatment systems) that
>>should be mentioned when lobbying politicians, landowners,
>>taxpayers, etc., to utilize these systems?
>
>Producive wastewater treatment addresses, amongst others,
>the global issue of water conservation and water reuse. While
>conventional systems "treat" wastewaters and then discharge
>them, I see a producive wastewater treatment as an
>integrated system which embrasses the principle of reuse of
>nutrients in a wastewater to produce food chain organisms,
>e.g. algae-fish-animals chain

>I would like to hear of more examples of producive
>wastewater treatment systems which has a fish farming
>component.
>
>From: (Mr) Eng-Leong.Foo@mtc.ki.se

Bailey Green of Berkeley's Sanitary Engineering Research Laboatory is heir to decades of experience in Asia and America. He has just come back from reviewing the Save the Ganga Program in India. He and I have agreed th we will prepare a letter to the Mudially Fishermen's Cooperative in Calcutta, which has agreed to keeping comprehensive records as it has grown and elaborated over the past five years. Dr. Dhrubajyoti Ghosh has been consulting with them. Bailey and I are asking if any help is needed to get the data analyzed and out to the world. I had prepared a background description of this success in 1992, which awaited data to be included in joint publication.

In Mudially one can see hundreds of acres of pond and bund integrated biologically, together with with market gardens based upon composted garbage and street sweepings irrigated by effluent. These few hundred of barely literate fishermen have added facilities for middle school education in the environment and public recreation to the mix.The only step missing is the cultivation of wild tiger prawns.It is the kind of technology that ought to be propagated along major stretches of the Ganga and other tropical rivers using the old channels.

Richard L. Meier

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 15:45 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA13347 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 15:45:11 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id PAA21182; Tue, 21 Mar 1995 15:20:19 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 5270 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 20:09:19
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7514; Tue, 21 Mar 1995 20:09:04 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Tue, 21 Mar
          95 20:09:01 +0100
Received: by ki.se id AA05413 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Tue, 21 Mar 1995 20:15:06 +0100
Posted-Date: Tue, 21 Mar 1995 15:45:11 -0500
Received-Date: Tue, 21 Mar 1995 15:45:11 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503212056.A2934-0100000@ki.se>
Date: Tue, 21 Mar 1995 20:15:05 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: beer brewery wastewater / fish farming
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1444
Status: RO

From: Mike Davies <MJD@FISHACE.DEMON.CO.UK>

>>Q. Have you thought of using the fishfarm effluent as crop
>>irrigation water, or is the loading too high?
>A. The loading leaving the farm is not expected to be much
>higher than 10 mg/l. It is not intended to use this water but to
>simply discharge back to river after wetland treatment.

this would also mean, in principle, that after this fishfarm effluent goes
through wetland treatment, it would be possible to reuse it in the fish
pond again (considerations will of course be needed with respect to fish
parasites and diseases; however there are good chances that the wetland
treatment will reduce their counts or numbers anyway).

>However we are also establishing a Micro-Brewery on the site
>and the organic waste from this will be used to culture fish
>food. Our aim is to attain a zero emission process.
>I would like to hear from anyone concerning the above.

This is interesting because the United Nations University is laucnhing a
similar project on 6-7th April at its World Congress on Zero Emission.
China received a contract to do the feasibility study on Zero Emission for

Beer Breweries and will gather local experts on April 1st in Beiijing to present the study and to propose the project workplan.

I am in the process of negotiating a contract with UNU which hopefully will allow me to set up a electronic network of the subject.

From: (Mr) Eng-Leong.Foo@mtc.ki.se

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 15:56 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA14428 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 15:56:28 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id PAA21165; Tue, 21 Mar 1995 15:20:07 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 5222 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 20:08:43
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7471; Tue, 21 Mar 1995 20:08:42 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Tue, 21 Mar
          95 20:08:41 +0100
Received: by ki.se id AA04850 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Tue, 21 Mar 1995 20:12:37 +0100
Posted-Date: Tue, 21 Mar 1995 15:56:28 -0500
Received-Date: Tue, 21 Mar 1995 15:56:28 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503212048.A2934-0100000@ki.se>
Date: Tue, 21 Mar 1995 20:12:36 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: detergents in wetlands
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 722
Status: O

From: Mike Davies <MJD@FISHACE.DEMON.CO.UK>

>>Q. How effective is the process at removing detergents?
>A. Not too sure to be honest but I believe they are quite good,
>although I have little data to back this sweeping statement up.

I would very much like to establish contacts with researchers who have looked into this group of pollutants in wetlands. If any of you have any info, pls share it with us.

My interest in particular is related to the treatment waste water from the bottle cleaning process in beer breweries. Similar situations are encountered whenever bottles need to be washed. An alternative approach is to use a sugar- based detergent which is biodegradable.

From: (Mr) Eng-Leong.Foo@mtc.ki.se

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 15:56 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA14476 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 15:56:56 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id PAA21114; Tue, 21 Mar 1995 15:19:36 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 4999 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 20:04:50
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7202; Tue, 21 Mar 1995 20:04:42 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Tue, 21 Mar
          95 20:04:39 +0100
Received: by ki.se id AA04304 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Tue, 21 Mar 1995 20:10:43 +0100
Posted-Date: Tue, 21 Mar 1995 15:56:56 -0500
Received-Date: Tue, 21 Mar 1995 15:56:56 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503212022.A2934-0100000@ki.se>
Date: Tue, 21 Mar 1995 20:10:42 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P15: Ammonia toxicity
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 938
Status: O

From: MJD <MJD@FISHACE.DEMON.CO.UK>

>>Q. What does the polishing process do to your river water?
>A. Primary concerns where Fe content and other trace metals,
>BOD, suspended solids and ammonia. ....Initial tests on
>ammonia removal have not looked promising but it is still very
>early stages with the system far from fully operational.

With regards to ammonia toxicity and I invite Marie Adamsson et al
(S3-P15) and the Stensund Wastewater Aquaculture group to join us in this
discussion. I am not familiar with ammonia toxicity (my earlier work on
the contrary has been to overproduce ammonia by nitrogen fixing bacteria)
I would appreciate the education.

Q: How serious is ammonia toxicity and what are the limits for fishes ?

Q: Ammonia is also produced in the fish ponds itself, how is it removed,
what are the aquatic biological mechanisms and how can it be reduced
mechanical ?

From: (Mr) Eng-Leong.Foo@mtc.ki.se

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 15:31 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA12031 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 15:31:32 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id MAA18248; Tue, 21 Mar 1995 12:36:04 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8599 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 17:46:53
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7957; Tue, 21 Mar 1995 17:46:51 +0100
Received: from vms1.gmu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Tue,
          21 Mar 95 17:46:47 +0100
Received: from VMS1.GMU.EDU by VMS1.GMU.EDU (PMDF V4.3-10 #8072) id
          <01HOEAKE0PQK004GN8@VMS1.GMU.EDU>; Tue, 21 Mar 1995 11:49:32 -0500
          (EST)
Posted-Date: Tue, 21 Mar 1995 15:31:32 -0500
Received-Date: Tue, 21 Mar 1995 15:31:32 -0500
MIME-version: 1.0
Content-transfer-encoding: 7BIT
Message-ID: <Pine.3.89.9503211136.C208196-0100000@VMS1.GMU.EDU>
Date: Tue, 21 Mar 1995 11:49:32 -0500
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Dann Sklarew <dsklarew@VMS1.GMU.EDU>
Subject: Re: wetlands in agriculture / developing countries
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
In-Reply-To: <Pine.3.89.9503210901.A28277-0100000@ki.se>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1210
Status: O

On Tue, 21 Mar 1995, Eng-Leong Foo mtc wrote:
> >Presently, agricultural practices account for the largest single
> >contribution to non-point source pollution.....
> >the agricultural community has been responsible for many of the advances
> >in pollution abatement that already have been made.....

This does not account for either atmospheric deposition nor natural
processes (e.g., N-fixation in soils), I presume, since they are
frequently overlooked in loading models, and subject to a
high degree of uncertainty (dry deposition and N-fixation)...?

> Q: Has there been any significant change of trend and attitude in the use
> of wetlands in the US from a narrow objective of wastewater treatment to
> an integration with e.g. food or fuelwood productions ?

The US is a bastion of terrestrial food and wood production, hence the need to resort to "marginal" wetlands for such needs does not appear to be a critical concern in general policy or public attitudes in this country. In addition, with our new Congress, it seems as if ecological integration could be factorred out of the cost/benefit analysis for wetland protection/conservation/construction.

Dann Sklarew
dsklarew@gmu.edu

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 13:12 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id NAA28425 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 13:12:02 -0500
Received:from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.d
c.lsoft.com (8.6.9/8.6.9) with SMTP id MAA17956; Tue 21 Mar 1995 12:29:16 -0500
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3688 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 15:55:36
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 0389; Tue, 21 Mar 1995 15:54:47 +0100
Received: from post.demon.co.uk by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Tue, 21 Mar 95 15:54:35 +0100
Received: from fishace.demon.co.uk by post.demon.co.uk id aa20888; 21 Mar 95
          14:11 GMT
Posted-Date: Tue, 21 Mar 1995 13:12:02 -0500
Received-Date: Tue, 21 Mar 1995 13:12:02 -0500
X-Mailer: FIMail V0.9d
X-User: Alpha Test Version Of FI-Mail, DisWin 1.5C:\WINSOCK\WINDIS
Lines: 33
Message-ID: <181@fishace.demon.co.uk>
Date: Tue, 21 Mar 1995 14:01:59 GMT
Reply-To: MJD@fishace.demon.co.uk
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: MJD <MJD@FISHACE.DEMON.CO.UK>
Subject: Re: Eng-Leong questions
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 1321
Status: O

Hi,

To answer your questions:

Q. What does the polishing process do to your river water?
A. Primary concerns where Fe content and other trace metals, BOD, suspended solids and ammonia. As the pH is around 7, 90% of the Fe is in particulate form and is filtered out physically along with the suspended solids. BOD input is low

at about 10 mg/l but this is reduced to less than 4 mg/l and thus reduces stress

upon the fish. Initial tests on ammonia removal have not looked promising but it

is still very early stages with the system far from fully operational.

Q. How effective is the process at removing detergents?
A. Not too sure to be honest but I believe they are quite good, although I have little data to back this sweeping ststement up.

Q. Have you thought of using the fishfarm effluent as crop irrigation water, or is the loading too high?
A. The loading leaving the farm is not expected to be much higher than 10 mg/l.

It is not intended to use this water but to simply discharge back to river after

wetland treatment. However we are also establishing a Micro-Brewery on the site and the organic waste from this will be used to culture fish food. Our aim is to

attain a zero emission process.

I would like to hear from anyone concerning the above.

cheers,

Mike Davies
The Earth Centre Project

--

From owner-et-loke@SEARN.SUNET.SE Tue Mar 21 04:49 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id EAA21836 for <tnaff@SAS.UPENN.EDU>; Tue, 21 Mar 1995 04:49:00 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id DAA12313; Tue, 21 Mar 1995 03:45:08 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 5462 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 09:36:28
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7720; Tue, 21 Mar 1995 09:36:20 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Tue, 21 Mar
          95 09:36:18 +0100
Received: by ki.se id AA00241 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Tue, 21 Mar 1995 09:42:21 +0100
Posted-Date: Tue, 21 Mar 1995 04:49:00 -0500
Received-Date: Tue, 21 Mar 1995 04:49:00 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503210901.A28277-0100000@ki.se>
Date: Tue, 21 Mar 1995 09:42:20 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: wetlands in agriculture / developing countries
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 796
Status: RO

>Presently, agricultural practices account for the largest single
>contribution to non-point source pollution.....
>the agricultural community has been responsible for many of the advances
>in pollution abatement that already have been made.....

Q: Has there been any significant change of trend and attitude in the use
of wetlands in the US from a narrow objective of wastewater treatment to
an integration with e.g. food or fuelwood productions ?

I think these are very important value-added aspects when one considers
the transfer of wetland technology for non-urban applications to many
developing countries.

From: (Mr) Eng-Leong.Foo@mtc.ki.se, Director, UNESCO Microbial Resources
Center, Karolinska Inst., S17177 Stockholm, Sweden. Fax: 46-8/331547
Phone: +46-8-326508

From owner-et-loke@SEARN.SUNET.SE Mon Mar 20 22:52 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id WAA06048 for <tnaff@SAS.UPENN.EDU>; Mon, 20 Mar 1995 22:52:37 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id WAA08733; Mon, 20 Mar 1995 22:47:11 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7836 for ET-LOKE@SEARN.SUNET.SE; Tue, 21 Mar 1995 04:38:52
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 6428; Tue, 21 Mar 1995 04:38:51 +0100
Received: from mail.tamu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Tue, 21 Mar 95 04:38:50 +0100
Received: from orca.tamu.edu (ORCA.TAMU.EDU [128.194.193.1]) by mail.tamu.edu
          (8.6.10/8.6.10) with SMTP id VAA03887 for <ET-LOKE@searn.sunet.se>;
          Mon, 20 Mar 1995 21:42:16 -0600
Received: by orca.tamu.edu (4.1/SMI-4.1) id AA22558; Mon, 20 Mar 95 21:42:16 CST

Posted-Date: Mon, 20 Mar 1995 22:52:37 -0500
Received-Date: Mon, 20 Mar 1995 22:52:37 -0500
Message-ID: <9503210342.AA22558@orca.tamu.edu>
Date: Mon, 20 Mar 1995 21:42:16 CST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Paul DuBowy <dubowy@ORCA.TAMU.EDU>
Subject: responding to a need
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 1694
Status: RO

To understand how to influence the public on the value of constructed wetlands for wastewater treatment, we need to understand the role that constructed wetlands play. For instance, increasingly the call is being made to make agriculture more compatible with environmental concerns. Presently, agricultural practices account for the largest single contribution to non-point source pollution. Runoff from cropland, pastures, feedlots, and farmsteads continues to add substantial inputs of nitrogen and phosphorus to our waterways and groundwater. However, the agricultural community has been responsible for many of the advances in pollution abatement that already have been made. Researchers continue to investigate alternative or non-traditional agricultural practices to minimize these inputs.

The utilization of biogeochemical processes found in natural wetlands as mechanisms in the treatment of urban, industrial, and agricultural wastewater has been in development for over forty years. We know that constructed wetlands work--where questions remain is under what conditions are constructed wetlands successful and, equally importantly, where do they fail. Additionally, design criteria and best management practices need to be developed to help federal, state,

and local agencies with the permitting, implementation, and monitoring of projects. This is not to imply that a single blueprint will ever be developed for all constructed wetlands--they will continue to be planned and constructed on a case-by-case basis.

Paul J. DuBowy
Associate Professor
p-dubowy@tamu.edu
Dept Wildlife & Fisheries Sciences
Texas A&M University
College Station, TX 77843-2258
(409) 845-5765

```
From owner-et-loke@SEARN.SUNET.SE Mon Mar 20 20:08 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id UAA24243 for <tnaff@SAS.UPENN.EDU>; Mon, 20 Mar 1995 20:08:57 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id SAA05097; Mon, 20 Mar 1995 18:50:23 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3727 for ET-LOKE@SEARN.SUNET.SE; Mon, 20 Mar 1995 23:37:27
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 6145; Mon, 20 Mar 1995 23:25:22 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 20 Mar
          95 23:25:18 +0100
Received: by ki.se id AA06146 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 20 Mar 1995 23:31:21 +0100
Posted-Date: Mon, 20 Mar 1995 20:08:57 -0500
Received-Date: Mon, 20 Mar 1995 20:08:57 -0500
Mime-Version: 1.0
Message-ID:  <Pine.3.89.9503202306.A3816-0100000@ki.se>
Date:         Mon, 20 Mar 1995 23:31:19 +0200
Reply-To: Eng-Leong Foo mtc <Eng-Leong.Foo@mtc.ki.se>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
             <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject:      update: "DATABASE OUTPUT" (msg 170-177)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
Content-Length: 533
Status: RO

Item #   Date    Time  Recs   Subject
------   ----    ----  ----   -------
000170 95/03/14 10:47   48   update: "DATABASE OUTPUT" (msg 148-169)
000171 95/03/14 12:28   35   Introduction from Yorkshire
000172 95/03/17 13:17   31   Re: Introductions and Discussion Wanted
000173 95/03/17 15:43   50   forward intro
000174 95/03/18 13:05   79   Intro: Ecotechnology KTH, Stockholm
000175 95/03/20 20:49   70   Earth Centre - UK
000176 95/03/20 21:18   27   Intro - MJD (?)
000177 95/03/20 12:43   23   Producive Wastewater Treatment

>
```

From owner-et-loke@SEARN.SUNET.SE Mon Mar 20 20:43 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id UAA26736 for <tnaff@SAS.UPENN.EDU>; Mon, 20 Mar 1995 20:43:46 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id SAA05069; Mon, 20 Mar 1995 18:49:28 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3470 for ET-LOKE@SEARN.SUNET.SE; Mon, 20 Mar 1995 23:35:05
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 5749; Mon, 20 Mar 1995 23:20:49 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 20 Mar
          95 23:20:47 +0100
Received: by ki.se id AA04863 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 20 Mar 1995 23:26:51 +0100
Posted-Date: Mon, 20 Mar 1995 20:43:46 -0500
Received-Date: Mon, 20 Mar 1995 20:43:46 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503202323.A3816-0100000@ki.se>
Date: Mon, 20 Mar 1995 23:26:50 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: W3: promotion in society
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2228
Status: RO

GERARD VOOS (@ SREL) <voos@srel.edu> wrote:

>How could productive wastewater treatment be promoted in
>society? What are the principal properties of these systems (as
>compared to conventional wastewater treatment systems) that
>should be mentioned when lobbying politicians, landowners,
>taxpayers, etc., to utilize these systems?

Producive wastewater treatment addresses, amongst others,
the global issue of water conservation and water reuse. While
conventional systems "treat" wastewaters and then discharge
them, I see a producive wastewater treatment as an
integrated system which embrasses the principle of reuse of
nutrients in a wastewater to produce food chain organisms,
e.g. algae-fish-animals chain

The approach which is demonstrated by the Stensund
Ecological Aquaculture (see abstracts) which treats 6 m3 per
day of the wastewater from a training center, has attracted
the attention of Swedish politicians. It is certainly a unique
example of an on-site productive wastewater plant which has
demonstrated the potential for food and aquarium fish

production, and green-house crops such as tomatoes.

Many developing countries still have the traditional practice of using househouse or farm wastewaters to fertilise fish ponds for algal growth which is eaten by the fish. The practice has been applied for agro-based industrial wastewaters, e.g. beer brewery wastewater for fish production in warmer parts of China. In more affluent societies as in developed countries, where fish that is grown on wastewater may not reach the dining table, they could be used by farmed minks & otters.

In developing countries, little attention by the media has been given to such practices because these household operations or small scale production units. Commercial ventures however want to see faster investment returns. I doubt the problem is the lack of such ideas, I think development and investment agencies should start to support small private companies and be less concerned over "high risks in their investments". Research funding rarely consider it.

I would like to hear of more examples of producive wastewater treatment systems which has a fish farming component.

From: (Mr) Eng-Leong.Foo@mtc.ki.se

From owner-et-loke@SEARN.SUNET.SE Mon Mar 20 15:13 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id PAA04820 for <tnaff@SAS.UPENN.EDU>; Mon, 20 Mar 1995 15:13:57 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id OAA02472; Mon, 20 Mar 1995 14:52:31 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 5536 for ET-LOKE@SEARN.SUNET.SE; Mon, 20 Mar 1995 20:43:51
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 4449; Mon, 20 Mar 1995 20:43:50 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 20 Mar
          95 20:43:46 +0100
Received: by ki.se id AA22092 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 20 Mar 1995 20:49:50 +0100
Posted-Date: Mon, 20 Mar 1995 15:13:57 -0500
Received-Date: Mon, 20 Mar 1995 15:13:57 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503202022.A12775-0100000@ki.se>
Date: Mon, 20 Mar 1995 20:49:49 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Earth Centre - UK
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 2769
Status: RO

---------- Forwarded message ----------
From: Stephen Bedford Clark <SBC@fishace.demon.co.uk>

We have several wastewater/aquaculture ongoing proposals and I would like
to communicate further with interested persons on the above.

BACKGROUND MATERIAL

AQUATIC ECOLOGY at THE EARTH CENTRE

The Earth Centre is an international centre promoting the adoption of
environmentally sound activities by individuals, business and government
through the mediums of education, exhibition and entertainment".

This extensive, ecological visitor attraction is located on a 320 acre
site at Conisbrough, South Yorkshire. United Kingdom and at maturity will
attract 1,000,000 visitors per annum. It's principle aims are to provide
unprecedented opportunities and facilities for popular insight to the
leading human, environmental and development themes and challenges of the
late 20th and early 21st centuries and to show the complex interactive
issues of environment and economy, ecology and industry, science and the
arts in an exciting, accessible and uplifting way.

Features to be included in the 1.93 million pound sterling first phase of development includes the establishment of new woodlands & wetlands, a visitor centre and "living earth" exhibition, an ecological adventure playpark, bakery and cafe, demonstration agriculture and horticulture areas and an AQUACULTURE CENTRE. It will open to the public in July 1995 and 100,000-150,000 paying visitors are expected to attend.

'Aquatic Ecology' will promote aquatic farming and ecology at the Earth Centre site. In phase one, twelve organically lined earth ponds, an extensive wetland 'production' area and a hatchery/ aquatic ecology visitor centre will be opened. The project is the United Kingdom's first major sustainable freshwater aquaculture initiative. The principle aims are to blend innovation, research, conservation and educational awareness into a common goal of aquatic sustainability and demonstrate this through a successful commercial enterprise.

Through The Earth Centre it also hoped to develop and demonstrate the integration of sustainable aquaculture and agriculture, emphasisng and researching topical areas of symbiosis in the production of foodstuffs. As a visitor attraction, living displays and contact exhibits will appeal to a broad audience of all ages and the ability to stimulate an enthusiastic and lively approach towards aquatic commercial and scientific education.

For further information or comments please contact:

Stephen Bedford Clark
Director of Aquatic Ecology
The Earth Centre
Kilners Bridge
Doncaster Road
Denaby Main
South Yorkshire
DN5 9DY
United Kingdom

Telephone: + 44 709 770566
Facsimile : + 44 709 861727
Email : SBC@fishace.demon.co.uk

From owner-et-loke@SEARN.SUNET.SE Sat Mar 18 07:39 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id HAA13268 for <tnaff@SAS.UPENN.EDU>; Sat, 18 Mar 1995 07:39:37 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id HAA12519; Sat, 18 Mar 1995 07:10:05 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 9014 for ET-LOKE@SEARN.SUNET.SE; Sat, 18 Mar 1995 13:01:59
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 2941; Sat, 18 Mar 1995 13:01:57 +0100
Received: from kth.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Sat, 18
          Mar 95 13:01:55 +0100
Received: from gis.lantm.kth.se (gis.lantm.kth.se [130.237.64.81]) by kth.se
          (8.6.10/8.6.10) with SMTP id NAA21273 for <ET-LOKE@SEARN.SUNET.SE>;
          Sat, 18 Mar 1995 13:05:32 +0100
Received: from LANTM/SpoolDir by gis.lantm.kth.se (Mercury 1.12); Sat, 18 Mar
          95 13:05:27 +0100
Received: from SpoolDir by LANTM (Mercury 1.12); Sat, 18 Mar 95 13:05:12 +0100
Posted-Date: Sat, 18 Mar 1995 07:39:37 -0500
Received-Date: Sat, 18 Mar 1995 07:39:37 -0500
Priority: normal
X-mailer: Pegasus Mail/Windows (v1.11a)
Message-ID: <1BF81AB7D8D@gis.lantm.kth.se>
Date: Sat, 18 Mar 1995 13:05:09 +0100
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Gunno Renman <GUNNREN@L.KTH.SE>
Organization: Lantmateri, KTH
Subject: Intro: Ecotechnology KTH, Stockholm
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 3436
Status: RO

Dear ET-LOKE Friends,

I am Gunno Renman working at the Royal Institute of Technology (KTH), Stockholm. I want to introduce myself and a group of people working with ecotechnology and its combination with GIS and remote sensing at our University. Part of the group will participate in the Ecotechnics conference and make presentations. I am a dr in ecology from the University of Umea, since 1986 holding a position at KTH where I try to put ecology and technology together. Our division and "group" consists of many professions and subjects; geology, hydrology, ecology, chemistry and, of course engineering. lIn short our research deals with :

1. Ecotechnological solutions for treatment of wastewater in rural areas.
2. Ecotech solutions for treatment of urban stormwater
3. Application of ecotechnology, GIS and remote sensing technologies

to land and water resources management - catchment oriented solutions.

We perform studies in the laboratory where we investigate different kinds of material (soil, plant species etc) suitable for use in constructed wetlands and, open or buried infiltration in soil. We use columns in size 0.75-1 m length and 0.3 m width. In focus for our research is the efficiency of different materials for removal of N, P and metals. We have some full-scale treatment plants in the field under construction in cooperation with companies and municipalities, where we can carry out experiments and investigations.

We look at the water pollution problems at the landscape and watershed level (holistic view!). Hence we concentrate our attention on comprehensive land management and landscape changes to elucidate the effective use of land and water resources within catchments. This approach need Geographic Information Systems (GIS) and remotely sensed imagery (RS). Powerful tools for analysing and evaluating spatial characterisics of the landscape are created by combining GIS, RS and a variety of other digital data. Embedded in a spatial decision support system this methodology should help researchers and managers to understand landscape transport processes, e.g. nutrient loses more precisely. Subsequently it should facilitate water quality improvement by stimulating more effective resources maagement practices, better selection of waste water treatment technology, and better policy making.

Four watersheds, three in Sweden and one in Poland, are at present used for our studies. One is urban, located to the city of Uppsala, the others in rural areas. Of great importance is our cooperation with Polish universities and authorities. Therefore, one watershed is located to the Mazurian Lakes District in the north-east corner of Poland. As a beginning, a three-year bilateral venture is established.

Our contributions at the conference in OEstersund will be presented in the sessions 1A (J. Aaltonen & P. Andersson), 2B (T. Ozimek), 3A (L.Johansson, G. Renman & H. Carlstroem), 4A (A. Hoegelin & G. Renman), 4B (J. Mosiej & G. Renman) and poster session 1 (T. Gumbricht, C. Mahlander & J. McCarthy).

Information on our University (not updated) and some, yet limited information a bout
our Department are found on Internet
http://www.ce.kth.se/Aom/aom.htm.

Gunno Renman

Royal Institute of Technology
Department of Civil and Environmental Engineering
Div. of Land and Water Resources
S-100 44 Stockholm, Sweden

E-mail: gunnren@l.kth.se
Fax: +46-8-4110775
Phone: +46-8-7906350

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 13:05 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id NAA03733 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 13:05:10 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id MAA17561; Mon, 13 Mar 1995 12:39:15 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7515 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 18:31:16
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 4239; Mon, 13 Mar 1995 18:31:12 +0100
Received: from ced.berkeley.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Mon, 13 Mar 95 18:31:03 +0100
Received: from [128.32.181.97] (wur1mac17.ced.berkeley.edu) by ced.berkeley.edu
          (4.1/SMI-4.1) id AA07570; Mon, 13 Mar 95 09:34:28 PST
Posted-Date: Mon, 13 Mar 1995 13:05:10 -0500
Received-Date: Mon, 13 Mar 1995 13:05:10 -0500
X-Sender: meier@chabot.ced.berkeley.edu
Mime-Version: 1.0
Message-ID: <v02110103ab8a950a9f4e@[128.32.181.97]>
Date: Mon, 13 Mar 1995 09:34:26 PST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Richard Meier <meier@CED.BERKELEY.EDU>
Subject: Re: food production from Wetlands (fwd)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text/plain; charset="us-ascii"
Content-Length: 4002
Status: RO

>On Mon, 6 Mar 1995, Richard Meier wrote:
>
>>   The wetland villagers ouside of Calcutta have innovated greatly in
>> the conversion of urban wastes--sewage, garbage and street sweepings--into
>> fish and vegetables to be sold back to Calcutta. It is all virtually
>> undocumented, because it is a flourishing cottage industry. Their fish
>>have kept the mosquito-borne diseases from afflicting Calcutta since
>>Independence.
>
>It is interesting to hear of this flourishing cottage industry of the
>"wetland villages". On the 8th of March I participated at a Swedish
>Academy of Sciences' seminar for UNU's Zero Emission initiative in
>Stockholm where Prof. Wenhua Li (Beijing) presented an outline of an
>on-going Chinese contribution to the UNU project. It is based on the use
>of wastes (solid, water and CO2) from beer breweries in an integrated food
>production system where fish farming is a major focus. China of course
>has a long tradition in this area. Because of the attention given to WATER

>conservation, integration of fish production in the use of wetland for
>wastewater treatment has a rapidly growing interest and importance.
>
>
>I wish to hear if any participant know of demo wetland projects for
>brewery
>wastewater.
>
>Yesterday, I also participated in a Biofocus Foundation Seminar on
>Eco-City, a follow-up of the TV-Dialogue between Beijing and Stockholm
>last Oct 26th. Prof. Rusong Wang (Beijing) presented a paper on such
>demo eco-city sites, one of which dealt with such a wetland-brewery
>wastewater-fish system in a southen county in China. Since he will be in
>Sweden for another 3 weeks, I will encourage him to provide more
>information on wetlands in China.
>
>
>From: (Mr) Eng-Leong.Foo@mtc.ki.se, Director, UNESCO Microbial Resources
>Center, Karolinska Inst., S17177 Stockholm, Sweden. Fax: 46-8/331547
>Phone: +46-8-326508

Dear Foo:

The Chinese society and culture has an extraordinarily rich experience in the conversion of human and animal wastes. I first saw this working in Taiwan as a consequence of pig farms that produced hams for Japan. They had to develop it to keep from drowning in pig manur, so they drew upon collective experience!

Still more impressive was the combination of modern science, leading to unexpected further innovations. For example, the fish had to kept alive between the surges in pig waste, so a single engineer contrived a technique for speeding up photosynthesis with the carbon dioxide content of biogas, by bubbling the crude biogas countercurrent with crude biogas. The agitation added to the efficiency of algal photosynthesis (a blue green filamentous species that could be easily filtered), and sulfides that cause biogas to smell were also mostly absorbed, so the product was an upgraded natural gas. The rate of photosynthesis was the highest known to science, so the cost of land rent was minimized. The algal mass could be pelletized, along with dried slaughterhouse wastes, and propelled into the middle of the fishpond. Somehow the fish could see the pellets coming, so they would jump a half meter out of the water to catch them on the fly.This feeding frenzy was quite a show! I suspect that the waterfowl would pick up pellets from the bottom of the pond that the fish missed.

All this, and much,much more, was compressed into the URBAN RECYCLE component that I introduced to help feed the cities of China in the next century, as described in the paper that I gave in the 1994 Beijing meeting.

Mangrove swamps are mostly distant from cities, but harvested for fuelwood barged to the metropolis. Some clearing had been initiated earlier for palm oil and rice production, but tiger prawns have a much higher payoff. Their efficient aquaculture requires fish meal (the largest project in bioresearch in the Royal Chulalongkorn University is to find a substitute, a goal which is not easy).The Ecuador/Peru upwelling is the main source of fishmeal.

Dick Meier

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 10:30 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id KAA19570 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 10:30:45 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id KAA15725; Mon, 13 Mar 1995 10:25:49 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3173 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 16:17:53
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7595; Mon, 13 Mar 1995 16:17:52 +0100
Received: from vms1.gmu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon,
          13 Mar 95 16:17:48 +0100
Received: from VMS1.GMU.EDU by VMS1.GMU.EDU (PMDF V4.3-10 #8072) id
          <01HO314GPLP8001WSA@VMS1.GMU.EDU>; Mon, 13 Mar 1995 10:20:41 -0500
          (EST)
Posted-Date: Mon, 13 Mar 1995 10:30:45 -0500
Received-Date: Mon, 13 Mar 1995 10:30:45 -0500
MIME-version: 1.0
Content-transfer-encoding: 7BIT
Message-ID: <Pine.3.89.9503131036.C89146-0100000@VMS1.GMU.EDU>
Date: Mon, 13 Mar 1995 10:20:40 -0500
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Dann Sklarew <DSKLAREW@VMS1.GMU.EDU>
Subject: Re: S3-p5 - [eco-]detoxifying ammonia in wastewater...
Comments: cc: Dann Sklarew <dsklarew@osf1.gmu.edu>
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
In-Reply-To: <Pine.3.89.9503130855.A11928-0100000@ki.se>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1266
Status: RO

> Toxicity Identification Evaluation at the
Stensund Wastewater Aquaculture >
> Marie Adamsson1, Gran Dave1, Lars Forsberg2 and Bjorn Guterstam2
> 1 Department of Zoophysiology, University of Gothenburg, Gothenburg, Sweden
> 2 Stensund Ecological Center, Trosa, Sweden

> studies. The purpose of this investigation was to study if toxic chemicals
> were limiting the production of zooplankton (Daphnia magna) in the
> aquaculture treatment system. The results showed that toxicity in the raw
> wastewater was due to higher metal concentrations, especially Cu, and
> ammonia. After the primary treatment in the anaerobic tank the toxicity
> was due to hydrogen sulphide and/or ammonia. Therefore, a successful
> cultivation of zooplankton like D. magna at Stensund was highly dependent
> upon a successful control of the ammonia concentration.
>
It is my understanding that nitrification (converstion of nitrogen from
ammonia to NOx) would remove some of the ammonia toxicity, but requires
AERobic conditions. Perhaps aeration/waterfall before arrival at the

aquiculture treatment system would help to detoxify the ammonia. Any other confirmations/suggestions for ammonia reduction, folks?

Dann Sklarew
Dept. of Biology,
George Mason University
Fairfax, VA USA

From owner-et-loke@SEARN.SUNET.SE Mon Mar 27 02:55 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id CAA08594 for <tnaff@SAS.UPENN.EDU>; Mon, 27 Mar 1995 02:55:41 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA01497; Mon, 27 Mar 1995 02:52:01 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7601 for ET-LOKE@SEARN.SUNET.SE; Mon, 27 Mar 1995 09:42:49
          +0200
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 2965; Mon, 27 Mar 1995 09:42:49 +0200
Received: from bunyip.cc.uq.oz.au by SEARN.SUNET.SE (IBM VM SMTP V2R2) with
          TCP; Mon, 27 Mar 95 09:41:27 +0200
Received: from cheque2.cheque.uq.oz.au by bunyip.cc.uq.oz.au with SMTP (PP);
          Mon, 27 Mar 1995 17:44:59 +1000
Received: from CHEQUE2/SpoolDir by cheque2.cheque.uq.oz.au (Mercury 1.20); 27
          Mar 95 17:44:16 GMT-10
Received: from SpoolDir by CHEQUE2 (Mercury 1.20); 27 Mar 95 17:43:52 GMT-10
Posted-Date: Mon, 27 Mar 1995 02:55:41 -0500
Received-Date: Mon, 27 Mar 1995 02:55:41 -0500
Priority: normal
X-mailer: Pegasus Mail/Windows (v1.22)
Message-ID: <A60812B5C@cheque2.cheque.uq.oz.au>
Date: Mon, 27 Mar 1995 17:43:46 GMT-10
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Dr Cynthia Mitchell <CYNTHIAB@CHEQUE2.CHEQUE.UQ.OZ.AU>
Subject: Re: plant selection
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 2142

I would like to take up on Paul du Bowy's comments about plants

I agree that the most important thing is to think about the treatment objectives for your wetlands when you decide on monoculture/diversity/plant species, and in fact, when you decide on anything else about your wetland system. I also think we still need lots of practice in making these decisions, because we are not doing a great job just yet.

I agree that we need hardy species, but different species may serve different purposes at different places in a wetland. Sure, Typha may be the best option at the head of a wetland receiving undiluted swine waste(although I am a little surprised - Gersberg's early work showed Typha was more susceptible to ammonia than other species they looked at). It may be that other species have other attributes which are useful in other pollutant removal processes.

I think we have to investigate a wider range of plants for their usefulness in wetlands. Currently, most systems employ good ol'

Typha and Phragmites. With a friendly botanist, I recently compiled a quick list of native Australian wetland species worth investigating - we came up with about 50 species! Any prospective PhD students interested in a botanical engineering research topic??

Whilst it may be true that plants are essentially just providing a surface for microbiological attachment in open surface systems, I think we need to look more closely at what sort of surface that is, and what impact it has on the types of organisms attach there.

In subsurface systems in particular, we are mostly interested in oxygen transfer - we should be using this as a selection criteria for wetland plants.

My two bob's worth, as we say down under.

Cynthia

<><><><><><><><><><><><><><><><><><><><><><><><><><><>
Dr Cynthia Mitchell
Lecturer in Environmental Engineering
Department of Chemical Engineering
The University of Queensland
Brisbane 4072 Australia

cynthiam@cheque.uq.oz.au
ph 61(0)7 365 3528 fax 61(0)7 365 4199
<><><><><><><><><><><><><><><><><><><><><><><><><><><>

'If it is to be, it is up to me.'

<><><><><><><><><><><><><><><><><><><><><><><><><><><>

From owner-et-loke@SEARN.SUNET.SE Sat Mar 25 21:04 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id VAA25523 for <tnaff@SAS.UPENN.EDU>; Sat, 25 Mar 1995 21:04:58 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id UAA24758; Sat, 25 Mar 1995 20:40:32 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 7921 for ET-LOKE@SEARN.SUNET.SE; Sun, 26 Mar 1995 02:31:46
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 9508; Sun, 26 Mar 1995 02:31:41 +0100
Received: from mail.tamu.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Sun, 26 Mar 95 02:31:39 +0100
Received: from orca.tamu.edu (ORCA.TAMU.EDU [128.194.193.1]) by mail.tamu.edu
          (8.6.10/8.6.10) with SMTP id TAA00790 for <ET-LOKE@SEARN.SUNET.SE>;
          Sat, 25 Mar 1995 19:35:11 -0600
Received: by orca.tamu.edu (4.1/SMI-4.1) id AA08125; Sat, 25 Mar 95 19:35:09 CST

Posted-Date: Sat, 25 Mar 1995 21:04:58 -0500
Received-Date: Sat, 25 Mar 1995 21:04:58 -0500
Message-ID: <9503260135.AA08125@orca.tamu.edu>
Date: Sat, 25 Mar 1995 19:35:09 CST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Paul DuBowy <dubowy@ORCA.TAMU.EDU>
Subject: monocultures vs biodiversity
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 2407
Status: RO

I agree with the point made that a wide diversity of plant species need not be planted in constructed wetlands. As was previously stated, plants primarily provide attachment sites for bacteria which accomplish most of the biogeochemical conversions.

There is a much more practical side to not planting a diversity of species--most aquatic species will not tolerate high ammonia levels. In our constructed wetlands in Indiana we have taken two different strategies. In our first two wetland complexes, we took spoil (soil and associated plants) from roadside ditches which were being cleared by the local highway department. This material was spread in the bottom of the wetland cells, kept watered, and in a short time wetland vegetation began to sprout. After a year of very high ammonia loadings (100-200 ppm), all that remained was a dense thicket of Typha latifolia with assorted annuals and grasses along the margin.

In our third wetland system we planted five wetland plant species to evaluate plant growth in extremely high ammonia loadings (>250 ppm--swine manure). After one growing season all that remained was Typha and Scirpus validus. The other species--including Phragmites

australis--died out. We now have a dense stand of Typha with some Scirpus. In all three cases we are acheiving 90+% reductions in NH4, NO3, PO4, and coliform bacteria and 70+% reductions in BOD5 and TSS.

What does it matter if we do not have a wide variety of plant species growing in the system? The primary purpose of these systems is water quality treatment and not biodiversity. People who believe they can achieve both need to examine their systems. In many cases, over time the less viable plant species will die out, and the robust species like Typha will flourish. In those cases you have several (not particularly attractive options): first, dilute the effluent to reduce ammonia levels, or second, continually replant the system to add those species which do not survive.

It is very hard to beat a Typha system, given its high tolerance to ammonia. I suggest researchers evaluate other local plant species to see which are tolerant to extreme conditions. The hardy species are the ones which will provide the most benefit.

pjd

Paul J. DuBowy
Associate Professor
p-dubowy@tamu.edu
Dept Wildlife & Fisheries Sciences
Texas A&M University
College Station, TX 77843-2258
(409) 845-5765

From owner-et-loke@SEARN.SUNET.SE Fri Mar 24 14:53 EST 1995
Return-ath: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id OAA22922 for <tnaff@SAS.UPENN.EDU>; Fri, 24 Mar 1995 14:53:56 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id OAA09888; Fri, 24 Mar 1995 14:29:27 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 6411 for ET-LOKE@SEARN.SUNET.SE; Fri, 24 Mar 1995 20:20:46
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 6725; Fri, 24 Mar 1995 20:20:34 +0100
Received: from ced.berkeley.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Fri, 24 Mar 95 20:20:32 +0100
Received: from [128.32.181.91] (wurlmac11.ced.berkeley.edu) by ced.berkeley.edu
          (4.1/SMI-4.1) id AA26858; Fri, 24 Mar 95 11:24:09 PST
Posted-Date: Fri, 24 Mar 1995 14:53:56 -0500
Received-Date: Fri, 24 Mar 1995 14:53:56 -0500
X-Sender: meier@chabot.ced.berkeley.edu
Mime-Version: 1.0
Message-ID: <v02110102ab99362bbff1@[128.32.181.91]>
Date: Fri, 24 Mar 1995 11:24:07 PST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Richard Meier <meier@CED.BERKELEY.EDU>
Subject: Re: Integrated waste treatment/fish/wetland
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text/plain; charset="us-ascii"
Content-Length: 1844
Status: O

Eng-Leong Foo asked:
>What are the risks of increased used of commercial fish feeds in these
>areas ?
>
>Chinese ditch-fish systems near expanding towns are starting to use
>commercial fish feeds. Salesmen tell farmers that they can double the fish
>yields. Painfull lessons have been learnt - pond owners start to increase
>the number of fishes per unit because feed is available, this usually
>upset the aquatic equilibrium of the pond. The owner then needs to install
>aerators and faces another bill for disease control. Quite often it has
>been shown that traditional fish farming takes home more money than the
>modern intensive fish farming.

In large fish farms based upon pig waste in south Taiwan the oxygen was used up after feeding fish and having some of the food imbedded in the mud at the bottom, so the fish were gasping at the in the early hours of the morning.Their first solution was to set up rafts in the center with a bicycle that had flaps attached to the wheels. On a calm night with no ripples on the pond, an employee would have to wade out and aerate the water. By 1986 they had scooter motors on such equipment and talked of automatic controls. That way they could get maximum yield per unit area of

pond, despite variability in pig waste supply. I have already mentioned their experiments with N-fixing anaboena algae accelerated with carbon dioxide from biogas being used for fish food or pigfood. That might add another 10% to efficiency

Oswald's experiments on ponds were greatly constrained by the strong American taboo regarding wastewaters, so fish could not be considered for California. Bailey Green has just completed a dissertation there which redesigns ponds to produce biogas economically. I supervised one which carries the ideas to Korean conditions two years ago.

Dick Meier

From owner-et-loke@SEARN.SUNET.SE Thu Mar 23 22:50 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id WAA23456 for <tnaff@SAS.UPENN.EDU>; Thu, 23 Mar 1995 22:49:59 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id PAA17356; Thu, 23 Mar 1995 15:22:35 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 0405 for ET-LOKE@SEARN.SUNET.SE; Thu, 23 Mar 1995 12:23:00
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3016; Thu, 23 Mar 1995 12:22:59 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Thu, 23 Mar
          95 12:22:57 +0100
Received: by ki.se id AA28323 (5.67a/IDA-1.5 for "ECOTEC/ECOTECHNICS95: S3/W3 -
          PRODUCTIVE WASTEWATER TREATMENT" <ET-LOKE@SEARN.SUNET.SE>); Thu, 23
          Mar 1995 12:29:03 +0100
Posted-Date: Thu, 23 Mar 1995 22:49:59 -0500
Received-Date: Thu, 23 Mar 1995 22:49:59 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503231107.A15180-0100000@ki.se>
Date: Thu, 23 Mar 1995 12:29:01 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: Re: Integrated waste treatment/fish/wetland
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
In-Reply-To: <v02110101ab967ae7009d@[128.32.181.91]>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1798
Status: O

Richard Meier wrote:

>In Mudially (Calcutta) one can see hundreds of acres of pond and bund
>integrated biologically, together with with market gardens based upon
>composted garbage and street sweepings irrigated by effluent.....The
>only step missing is the cultivation of wild tiger prawns.It is the kind
>of technology that ought to be propagated along major stretches of the
>Ganga and other tropical rivers using the old channels.

What are the risks of increased used of commercial fish feeds in these
areas ?

Chinese ditch-fish systems near expanding towns are starting to use
commercial fish feeds. Salesmen tell farmers that they can double the fish
yields. Painfull lessons have been learnt - pond owners start to increase
the number of fishes per unit because feed is available, this usually
upset the aquatic equilibrium of the pond. The owner then needs to install
aerators and faces another bill for disease control. Quite often it has
been shown that traditional fish farming takes home more money than the
modern intensive fish farming.

I visit Oswald's group in Berkeley in the late 70's, at that time I remember their focus was wastewater treatment using algae in very large ponds. I believe this technology is certainly useful if the effluent waters (enriched with algae) are directed to fish ponds. I would even suggest a wetland area to mob up the increased organic loading from the fish ponds before the waters enter the Ganga.

The situation entirely different if the Ganga project will use Ganga waters to encourage a new livelihood based on fish farming for the people. There are many risks here.

From: (Mr) Eng-Leong.Foo@mtc.ki.se, Director, UNESCO Microbial Resources Center, Karolinska Inst., S17177 Stockholm, Sweden. Fax: 46-8/331547 Phone: +46-8-326508

From owner-et-loke@SEARN.SUNET.SE Fri Mar 24 13:11 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id NAA14764 for <tnaff@SAS.UPENN.EDU>; Fri, 24 Mar 1995 13:11:23 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id MAA06606; Fri, 24 Mar 1995 12:25:04 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 8450 for ET-LOKE@SEARN.SUNET.SE; Fri, 24 Mar 1995 18:16:03
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 7220; Fri, 24 Mar 1995 18:16:03 +0100
Received: from ced.berkeley.edu by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Fri, 24 Mar 95 18:16:00 +0100
Received: from [128.32.181.91] (wurlmac11.ced.berkeley.edu) by ced.berkeley.edu
          (4.1/SMI-4.1) id AA21996; Fri, 24 Mar 95 09:19:35 PST
Posted-Date: Fri, 24 Mar 1995 13:11:23 -0500
Received-Date: Fri, 24 Mar 1995 13:11:23 -0500
X-Sender: meier@chabot.ced.berkeley.edu
Mime-Version: 1.0
Message-ID: <v02110102ab991a4d59d3@[128.32.181.91]>
Date: Fri, 24 Mar 1995 09:19:33 PST
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Richard Meier <meier@CED.BERKELEY.EDU>
Subject: Re: The Stensund Processes
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text/plain; charset="us-ascii"
Content-Length: 694
Status: O

A very understandable description of the path from wastewater to fish and vegetables at Stensund! I saw an Asian parallel in 1992 outside of Seoul, Korea,which was started with consultancy from Taiwan. It had grown to three large tank areas protected by plastic covers on the basis of local improvements.

One added touch was the presentation of clean, aerated hungry fish in a downtown tank with rented fishlines for family recreation (many are eaten raw on the spot with sauce and horseradish). Japanese suggest that it could be made more of a sport by programming the fingerlings to avoid the standard fish lures. Then it takes some expertise to catch adult fish.

Dick Meier

From owner-et-loke@SEARN.SUNET.SE Fri Mar 24 20:29 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id UAA16436 for <tnaff@SAS.UPENN.EDU>; Fri, 24 Mar 1995 20:29:06 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id UAA14761; Fri, 24 Mar 1995 20:06:39 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 9537 for ET-LOKE@SEARN.SUNET.SE; Sat, 25 Mar 1995 01:57:54
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3031; Sat, 25 Mar 1995 01:57:53 +0100
Received: from smtpgw.mw.com by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Sat, 25 Mar 95 01:57:49 +0100
Posted-Date: Fri, 24 Mar 1995 20:29:06 -0500
Received-Date: Fri, 24 Mar 1995 20:29:06 -0500
X-Mailer: Mail*Link SMTP-QM 3.0.2
Message-ID: <n1416057738.12439@smtpgw.mw.com>
Date: Fri, 24 Mar 1995 16:57:11 U
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Glenn Dombeck <Glenn_Dombeck@SMTPGW.MW.COM>
Subject: Re: Ammonia toxicity and re
Comments: To: MJD@fishace.demon.co.uk
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 1147
Status: O

        Reply to: RE>>Ammonia toxicity and removal

I just got back from attending a seminar on Natural Treatment Systems. Sherwood Reed gave an excellent presentation on constructed wetlands, in which he emphatically expressed that from a treatment perspective, plant species diversity is not an important factor. Plants serve mainly to provide sites for bacteria to attach to and to transport oxygen to the media through the roots. From this perspective reeds (phragmites) are ideal for constructed wetlands because they have limited habitat value and food value. Soft tissue flowering plants detract from treatment by increasing nutrients in the discharge via decomposition.

I'm not saying that plant diversity isn't important. I still tend to think it is for all of the other benefits they add, such as habitat value, market value, aesthetics, etc. However, I believe that you must design your treatment system with the treatment perspective in mind. Therefore, you may want to use the best plant species for treatment in your treatment wetland and discharge to a habitat wetland in which you maximize plant species diversity.

--

From owner-et-loke@SEARN.SUNET.SE Fri Mar 24 11:57 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (root@linus.dc.lsoft.com [204.156.25.72]) by o
rion.sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id LAA08642 for <tnaff@SAS.UPENN.EDU>; Fri, 24 Mar 1995 11:57:17 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id LAA04866; Fri, 24 Mar 1995 11:01:03 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3525 for ET-LOKE@SEARN.SUNET.SE; Fri, 24 Mar 1995 16:52:13
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 0496; Fri, 24 Mar 1995 16:52:13 +0100
Received: from post.demon.co.uk by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP;
          Fri, 24 Mar 95 16:52:10 +0100
Received: from fishace.demon.co.uk by post.demon.co.uk id aa12278; 24 Mar 95
          15:01 GMT
Posted-Date: Fri, 24 Mar 1995 11:57:17 -0500
Received-Date: Fri, 24 Mar 1995 11:57:17 -0500
X-Mailer: FIMail V0.9d
X-User: Alpha Test Version Of FI-Mail, DisWin 1.5C:\WINSOCK\WINDIS
Lines: 35
Message-ID: <195@fishace.demon.co.uk>
Date: Fri, 24 Mar 1995 14:49:31 GMT
Reply-To: MJD@fishace.demon.co.uk
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: MJD <MJD@FISHACE.DEMON.CO.UK>
Subject: Re: Ammonia toxicity and removal
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: text
Content-Length: 1548
Status: O

Hi,

To answer the question how is ammonia removed?

Ammonia is converted to nitrite and then nitrate by a process known as nitrification. The nitrate is subsequently removed by a process known as denitrification which converts the nitrate again to nitrite then to gaseous end products.

Constructed wetlands that treat domestic sewage have proved to be poor at ammonia removal, achieving between 0 - 30%. This is due to the fact that the autotrophic organisms which convert the ammonia to nitrate are outcompeted by heterotrophic organisms. Nitrosomas and Nitrobacter are the organisms responsible for the nitrification process. They assimilate carbon dioxide as a source of carbon but the energy required to do this is high and due to the low energy yield resulting from this they achieve very low growth rates. If BOD levels are higher than approximately 15 mg/l then the autotrophic organisms are outcompeted for the available oxygen and growth sites by the heterotrophic organisms.

The fish farm effluent from our farm is not expected to contain higher than 10 mg/l BOD and we therefore expect to achieve reasonable ammonia removal rates. As

a result of this conference I have also changed the design of the system so that

instead of planting reeds a wide variety of crops are to be planted and harvested. We are hoping to experiment with crop types but any suggestions are welcome. I would like to know if a strain of rice has been developed that could be grown in northern England.

Cheers,

Mike Davies
The Earth Centre Project

--

----- Original message follows -----
Return-Path: <stensund>
Received: from localhost (stensund@localhost) by nn.apc.org (8.6.5/Revision: 1.1
80) id XAA18888 for et-loke@searn.sunet; Thu, 23 Mar 1995 23:17:40 GMT
Date: Thu, 23 Mar 1995 23:17:40 GMT
From: <stensund>
Message-Id: <199503232317.XAA18888@nn.apc.org>
To: et-loke@searn.sunet
Subject: Re:s3-p5 eco-detoxifying ammonia in ww...

On 13 March 1995, Dann Sklarew wrote:

> It is my understanding that nitrification (conversion of
nitrogen from
> ammonia to NOx) would remove some of the ammonia toxicity, but
> requires AERobic conditions. Perhaps aeration/waterfall before
> arrival at the aquaculture would help to detoxify the ammonia.

Dear Dann:

Thanks for the comment. You are right about nitrification needing "AERobic" conditions, but the situation is significantly more complicated than can be fixed by just aeration. The nitrification occurs with the help of two families of autrophic, oxygen-demanding bacteria which compete with the aerobic BOD-decomposers. As a consequence, the process also requires a good aerated biofilter of some kind.

The paper on "Toxicity Identification Evaluation at the Stensund Wastewater Aquaculture" (S3-P5 eco-detoxifying...) traces the content of toxic chemicals in the Stensund Wastewater Aquaculture at certain sampling sites. Since the first measurements were made in 1993, an aerobic biofilter was installed after the anaerobic tank step, so that sampling in 1994 reveals an improvement, i.e. a reduction, in the ammonia levels. At the current flow (load), ammonia levels are now lower due to the biofilter. The problem now is to redimension the biofilter to accomodate a larger flow and thus a higher load.

At the Ecotechnics 95 conference next week, the completed paper, "Stensund Wastewater Aquaculture: Operational aspects of nitrification" (S3-p14), will be presented and will address the nitrification problem, both in general and in regards to the situation at Stensund.

I realise that not so much information has been given to this forum for discussing the Stensund Wastewater Aquaculture, so I can present a little here. Due to lack of time I give just a very general description, taken from our brochure:

Stensund Wastewater Aquaculture is a demonstration plant for ecological engineering for wastewater treatment. It was constructed in 1989 as an aquaculture inside a greenhouse, and it is located in a Nordic climate at 60 deg. N. lat, about 70 km south of Stockholm. The facility treats the wastewater generated by the adjacent Stensund Folk College year round and the goal is

to develop and demonstrate a recycling concept for the wastewater resources of nitrogen, phosphorus and heat energy.

The facility is basically an indoor wastewater aquaculture housed in a greenhouse structure. It employs a constructed food chain to detoxify and decompose wastewater, and the premise is to reuse the "waste", i.e. plant nutrients N and P, in wastewater as a resource to produce biomass. Therefore, we need to have the ammonia content at a level good for biomass cultivation. Increased biomass production through the whole wastewater aquaculture means cleaner effluent, e.g. N and P reduction.

Different stages of the Stensund Wastewater Aquaculture. (Steps 1-8 are indoors)
1. The wastewater is pumped from a storage tank into the aquaculture.
2. Anaerobic tank for degradation of organic compounds and precipitation of metal sulfides by sulfur-metabolising bacteria.
3. Aerated biofilter (filled with LECA (TM) pellets) to both oxidise the organic matter and nitrify the wastewater.
4. Algae tank for phytoplankton cultivation.
5. Zooplankton tank (Daphnia & Ceriodaphnia, Copepoda, Rotifera, Ostracoda, Protozoa). Aquatic plants cultivated on surface.
6. Farming of fish in basins with tropical aquatic plants, tropical ferns and the temperate duckweed. 6a. Fish polyculture tank (mix of tropical and temperate fishes, e.g. Tilapia, paco, algae grazer, various species of carp). 6b. "Fish globe", a tank for aquatic fish and plants.
7. Hydroponic channels for cultivation of plants like tomatoes and willows.
8. Water staircase (FlowForms) to aerate the water as it leaves the indoor part of the aquaculture.
9. The water then flows to an outdoor pond before running down more water staircases, through a small forested area, and eventually to the Baltic Sea.

I hope that this is interesting information for the list's subscribers.

Best regards, Lasse Forsberg
Stensund Ecological Center
stensund@nn.apc.org

LEF:akc

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:10 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25024 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:10:45 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10497; Mon, 13 Mar 1995 02:33:56 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3833 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:26:24
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3231; Mon, 13 Mar 1995 08:26:24 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:26:23 +0100
Received: by ki.se id AA10501 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:32:21 +0100
Posted-Date: Mon, 13 Mar 1995 03:10:45 -0500
Received-Date: Mon, 13 Mar 1995 03:10:45 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130840.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:32:21 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P26: Abstract - Amanda Hogelin & Gunno Renman (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1022

Where to Apply Ecotechnological Measures In the Landscape? A Case Study Within a Watershed Near Stockholm, Sweden

Amanda Hogelin and Gunno Renman
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm, Sweden

The excessive load of nutrients into the water system of Akerstrommen, near Stockholm, Sweden, was investigated and quantified. This data and landscape information created the basis for evaluation of optimal solutions for reducing the load. The territory is mainly rural, with settlements spread out over the entire area, and with agriculture and forestry as predominating activities. The methods to identify point and non-point sources of pollution, and to investigate natural environmental prerequisites for adapting ecotechnological measures are described. Rehabilitation of the landscape by creation or development of wetlands and ecotones and prevention of nutrient load from failing septic systems are of particular importance.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:22 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25205 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:22:24 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10460; Mon, 13 Mar 1995 02:33:07 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3820 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:25:33
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3210; Mon, 13 Mar 1995 08:25:32 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:25:30 +0100
Received: by ki.se id AA10251 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:31:30 +0100
Posted-Date: Mon, 13 Mar 1995 03:22:24 -0500
Received-Date: Mon, 13 Mar 1995 03:22:24 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130819.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:31:29 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P25: Abstract - U.Mander (Estonia) & L.Vought (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 4809

Nitrogen and Phosphorus Removal in Riparian Alder Forests

Ulo Mander1 & Lena Vought2
1 Department of Geography, University of Tartu, Estonia
2 Limnology Institute, University of Lund

Alder (Alnus spp.) forests are typical riparian ecosystems in Europe which can retain and transform nutrient fluxes from adjacent intensively used territories. However, only few studies have been thoroughly carried out to investigate their buffering capacity and the results show contradictory findings (Knauer and Mander, 1989; Binkley et al., 1992; Vought et al., 1994). Due to atmospheric nitrogen fixation by root nodules containing an actinomycetal fungal endophyte (up to several hundred kg N ha-1 year-1), alders have been expected to act as an additional source of nitrogen pollution of water bodies. In addition, via the intensive nitrogen load, the phosphorus cycling can be heavily affected. In this paper, preliminary results of two studies on nitrogen and phosphorus removal in riparian alder forests of different type will be presented. The first study has been carried out in 1993 in the Lake Hammarsj|n catchment, Scania, Sweden. The main aim was to find out differences in N and Pconcentrations in soil and soil water of differently aged black alder stands. In each of five study sites around the Lake Hammarsj|n, three age classes (1-5, 10-20, and

30-50 years) of black alder (Alnus glutinosa L.) stands, and for comparison, one grassland patch and one willow (mainly Salix caprea L.) stand have been investigated. Soil samples (from 0-10 and 30-40 cm depth) and soil water samples (0,3-1,2 m) were taken as 7 replicates and analyzed for pH,total-N, NH4, NO2,NO3, total-P and PO4 concentration. Preliminary results enable to draw the following conclusions: (1) there is a slight increase in nitrogen concentration both in soils and soil water within the older (>30 years) black alder forest stands, however, the variation of values both between sites and replicates is high; (2) a significantly higher concentration of phosphorus was found in the soils and soil water under the grasslands, nevertheless, there was no significant differences in phosphorus concentrations of differently aged alder stands; (3) older black alder stands may serve as additional sources of nitrogen pollution, therefore, a regular harvesting of these communities is to be recommended to avoid nitrogen and phosphorus accretion within riparian zones. Another study has been planned for 1994-1995 and is carried out in two differently loaded white alder (Alnus incana (L.) Moench.) stands in South Estonia: one in the natural conditions without any significant groundwater/overland flow inputs (in the Porij|gi Rivercatchment, Tartu County), and another downslope from the point pollution source (large pig farm complex with an intensively used pasture; Viiratsi, Viljandi County). The main problem of this study was to clarify the ability of white alder forests, the most typical ecosystems of riparian areas in Estonia and adjacent territories, to retain the additional N and P fluxes from intensively used agricultural fields and farms, and relocate these to the internal cycling via the acceleration of biomass production and humus formation. For this purpose, the following main N and P cycles and budgets have been estimated: inputs (atmospheric deposition, groundwater and overland flow), transformation and storage (above-ground plant biomass, below-ground plant biomass, net primary above-ground production, primary below-ground production, soil organic matter, autumn retranslocation from senescing leaves, leaching from canopies, litter fall, leaching from litter fall and whole tree mortality, litter mineralization, nitrogen fixation by alder nodules, nitrification, accumulation in soil), outputs (denitrification, leaching into the groundwater and stream). The preliminary results of the first study year enable to conclude that despite the heavy additional load over atmospheric deposition and polluted overland/subsurface flow the buffering capacity of white alder forest stands is approximately the same as in the unloaded area. The additional N and P fluxes will are compensated with increasing biomass productivity (also, within meadow communities dominating by Filipendula ulmaria, Cirsium oleraceum, Aegopodium podagraria, and Urtica dioica), higher denitrification value, and humus formation. Anyway, an effective and normal way of nutrient removal from riparian zones is biomass harvesting. Estimated average annual denitrification rate within riparian white alder stands and meadows will be about 1700 kg N ha-1year-1 then, in addition, the nutrient removal via harvesting could remove 30 % of annual nitrogen accumulating both in vegetation and soils. For phosphorus this rate will be probably 20 %.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:22 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25205 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:22:24 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10460; Mon, 13 Mar 1995 02:33:07 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3820 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:25:33
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3210; Mon, 13 Mar 1995 08:25:32 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:25:30 +0100
Received: by ki.se id AA10251 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:31:30 +0100
Posted-Date: Mon, 13 Mar 1995 03:22:24 -0500
Received-Date: Mon, 13 Mar 1995 03:22:24 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130819.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:31:29 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P25: Abstract - U.Mander (Estonia) & L.Vought (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 4809

Nitrogen and Phosphorus Removal in Riparian Alder Forests

Ulo Mander1 & Lena Vought2
1 Department of Geography, University of Tartu, Estonia
2 Limnology Institute, University of Lund

Alder (Alnus spp.) forests are typical riparian ecosystems in Europe which can retain and transform nutrient fluxes from adjacent intensively used territories. However, only few studies have been thoroughly carried out to investigate their buffering capacity and the results show contradictory findings (Knauer and Mander, 1989; Binkley et al., 1992; Vought et al., 1994). Due to atmospheric nitrogen fixation by root nodules containing an actinomycetal fungal endophyte (up to several hundred kg N ha-1 year-1), alders have been expected to act as an additional source of nitrogen pollution of water bodies. In addition, via the intensive nitrogen load, the phosphorus cycling can be heavily affected. In this paper, preliminary results of two studies on nitrogen and phosphorus removal in riparian alder forests of different type will be presented. The first study has been carried out in 1993 in the Lake Hammarsj|n catchment, Scania, Sweden. The main aim was to find out differences in N and Pconcentrations in soil and soil water of differently aged black alder stands. In each of five study sites around the Lake Hammarsj|n, three age classes (1-5, 10-20, and

30-50 years) of black alder (Alnus glutinosa L.) stands, and for comparison, one grassland patch and one willow (mainly Salix caprea L.) stand have been investigated. Soil samples (from 0-10 and 30-40 cm depth) and soil water samples (0,3-1,2 m) were taken as 7 replicates and analyzed for pH,total-N, NH4, NO2,NO3, total-P and PO4 concentration. Preliminary results enable to draw the following conclusions: (1) there is a slight increase in nitrogen concentration both in soils and soil water within the older (>30 years) black alder forest stands, however, the variation of values both between sites and replicates is high; (2) a significantly higher concentration of phosphorus was found in the soils and soil water under the grasslands, nevertheless, there was no significant differences in phosphorus concentrations of differently aged alder stands; (3) older black alder stands may serve as additional sources of nitrogen pollution, therefore, a regular harvesting of these communities is to be recommended to avoid nitrogen and phosphorus accretion within riparian zones. Another study has been planned for 1994-1995 and is carried out in two differently loaded white alder (Alnus incana (L.) Moench.) stands in South Estonia: one in the natural conditions without any significant groundwater/overland flow inputs (in the Porij|gi Rivercatchment, Tartu County), and another downslope from the point pollution source (large pig farm complex with an intensively used pasture; Viiratsi, Viljandi County). The main problem of this study was to clarify the ability of white alder forests, the most typical ecosystems of riparian areas in Estonia and adjacent territories, to retain the additional N and P fluxes from intensively used agricultural fields and farms, and relocate these to the internal cycling via the acceleration of biomass production and humus formation. For this purpose, the following main N and P cycles and budgets have been estimated: inputs (atmospheric deposition, groundwater and overland flow), transformation and storage (above-ground plant biomass, below-ground plant biomass, net primary above-ground production, primary below-ground production, soil organic matter, autumn retranslocation from senescing leaves, leaching from canopies, litter fall, leaching from litter fall and whole tree mortality, litter mineralization, nitrogen fixation by alder nodules, nitrification, accumulation in soil), outputs (denitrification, leaching into the groundwater and stream). The preliminary results of the first study year enable to conclude that despite the heavy additional load over atmospheric deposition and polluted overland/subsurface flow the buffering capacity of white alder forest stands is approximately the same as in the unloaded area. The additional N and P fluxes will are compensated with increasing biomass productivity (also, within meadow communities dominating by Filipendula ulmaria, Cirsium oleraceum, Aegopodium podagraria, and Urtica dioica), higher denitrification value, and humus formation. Anyway, an effective and normal way of nutrient removal from riparian zones is biomass harvesting. Estimated average annual denitrification rate within riparian white alder stands and meadows will be about 1700 kg N ha-1year-1 then, in addition, the nutrient removal via harvesting could remove 30 % of annual nitrogen accumulating both in vegetation and soils. For phosphorus this rate will be probably 20 %.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:01 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA22890 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:01:14 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10430; Mon, 13 Mar 1995 02:31:56 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3798 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:24:23
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3177; Mon, 13 Mar 1995 08:24:15 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:24:12 +0100
Received: by ki.se id AA09693 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:30:11 +0100
Posted-Date: Mon, 13 Mar 1995 03:01:14 -0500
Received-Date: Mon, 13 Mar 1995 03:01:14 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130834.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:30:11 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P24: Abstract - Yan Jingsong (P.R.China)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 1804

Organic Wastewater Recovery, Conversion, Reuse and Recycling in a Pharmaceutical Factory

Yan Jingsong
Nanjing Institute of Geography & Limnology, Academia Sinica, Nanjing, China

Boyin pharmaceutical factory mainly produces 12,000 t of starch, 4,000 t of glucose and discharges 200,000 t of highly concentrated wastewater a year. A plan for treatment and utilization of this wastewater is being put in practice.

The first step of this plan is annual recovery of about 300 t of starch, protein and oil from the wastewater, and reduction of 70-80% of BOD and COD of this wastewater. The second step is conversion of some remaining organic matter and inorganic nutrients into food and green fodder. The water after treatment is reused for production in this pharmaceutical factory.

The remained green fodder of duck that is not used in the animal food production, is used for raw materials of biogas fermentation. The biogas is used as one of the energy sources of this factory. The waste liquid residue from biogas production is used for top dressing and as a harmless pesticide for the corn and vegetable fields or culture solution for

hydroponic cultivation of vegetables and green fodder. The solid slag from biogas fermentation is used as a part of the foods of cultured fish and a cultivation medium for edible fungi. The residue and detritus of fungus beds after harvesting mushrooms is used as the medium for earthworm breeding. The earthworms are then recycled into the system. Also the excrement of fish and mud from the pond are recycled.

The processes combines ecological engineering for treatment and utilization of organic wastewater by multilayer and graded utilization of waste in all or most processes of production, and beneficial recycling in this system to make zero discharge.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:21 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25194 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:21:23 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) with SMTP id CAA10420; Mon, 13 Mar 1995 02:31:47 -050
0
Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3796 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:24:11
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3173; Mon, 13 Mar 1995 08:23:27 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:23:24 +0100
Received: by ki.se id AA09637 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:29:23 +0100
Posted-Date: Mon, 13 Mar 1995 03:21:23 -0500
Received-Date: Mon, 13 Mar 1995 03:21:23 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130848.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:29:22 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P20: Abstract - Lena Johanson et al (Sweden)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 734

Light Expanded Clay Aggregates (LECA) as Reactive Filter Media in Constructed Wetlands

Lena Johansson, Gunno Renman and Hans Carlstrom
Division of Land and Water Resources, Department of Civil and Environmental Engineering, Royal Institute of Technology, Stockholm, Sweden

Light expanded clay aggregates (LECA) have proved to be a suitable medium for removal of phosphorus from polluted water. The material, in the grain size range 0-4 mm, has successfully been used in constructed wetlands and in other applications as well. Results from different laboratory investigations, batch and column experiments on LECA are presented. Mechanisms responsible for the phosphorus removal, i.e. anion exchange and adsorption, are discussed.

From owner-et-loke@SEARN.SUNET.SE Mon Mar 13 03:15 EST 1995
Return-Path: <owner-et-loke@SEARN.SUNET.SE>
Received: from linus.dc.lsoft.com (linus.dc.lsoft.com [204.156.25.72]) by orion.
sas.upenn.edu (8.6.11/8.2SAS) with ESMTP
        id DAA25120 for <tnaff@SAS.UPENN.EDU>; Mon, 13 Mar 1995 03:15:46 -0500
Received: from PEACH.EASE.LSOFT.COM (eva.dc.lsoft.com [204.156.25.66]) by linus.
dc.lsoft.com (8.6.9/8.6.9) wth SMTP id CAA10379; Mon, 13 Mar 1995 02:30:21 -0500

Received: from SEARN.SUNET.SE by SEARN.SUNET.SE (LISTSERV release 1.8b) with
          NJE id 3786 for ET-LOKE@SEARN.SUNET.SE; Mon, 13 Mar 1995 08:22:45
          +0100
Received: from SEARN (NJE origin SMTPF@SEARN) by SEARN.SUNET.SE (LMail
          V1.2a/1.8a) with BSMTP id 3157; Mon, 13 Mar 1995 08:22:45 +0100
Received: from ki.se by SEARN.SUNET.SE (IBM VM SMTP V2R2) with TCP; Mon, 13 Mar
          95 08:22:41 +0100
Received: by ki.se id AA09384 (5.67a/IDA-1.5 for "ECOTEC-ECOTECHNICS95: S3/W3"
          <et-loke@searn.sunet.se>); Mon, 13 Mar 1995 08:28:40 +0100
Posted-Date: Mon, 13 Mar 1995 03:15:46 -0500
Received-Date: Mon, 13 Mar 1995 03:15:46 -0500
Mime-Version: 1.0
Message-ID: <Pine.3.89.9503130808.A11928-0100000@ki.se>
Date: Mon, 13 Mar 1995 08:28:40 +0200
Reply-To: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
Sender: "ECOTEC/ECOTECHNICS95: S3/W3 - PRODUCTIVE WASTEWATER TREATMENT"
              <ET-LOKE@SEARN.SUNET.SE>
From: Eng-Leong Foo mtc <Eng-Leong.Foo@MTC.KI.SE>
Subject: S3-P19: Abstract - P. Kowalik et al (Poland)
To: Multiple recipients of list ET-LOKE <ET-LOKE@SEARN.SUNET.SE>
Content-Type: TEXT/PLAIN; charset=US-ASCII
Content-Length: 805

Constructed Wetland for Landfill Leachate Treatment

P. Kowalik, F. Slater and P. Ranudeonen
Technical University of Gdansk, Gdansk, Poland

The constructed wetlands received much attention for treatment of wastewater from rural areas and sites with seasonally fluctuating loads. The landfill leachate treatment on the constructed wetland occurs due to the interaction of the wastewater with soil, vegetation and microorganisms. A case study of leachate treatment from Wales (U.K.) is presented, from Nantmel tip. Measurements of nitrogen transformation in a reed bed indicate that it is capable of successfully treating landfill leachate. It is vital to make sure how this technique may be applied under a variety of different site and climate conditions and to determine its long-term sustainability.