species diversity/ coastal areas/ literature reviews
This citation is from AGRICOLA.

1482. **Root zone solute dynamics under drip irrigation: A review.**
Mmolawa, K. and Or, D.
*Plant and Soil* 222 (1/2): 163-190. (2000)
*NAL Call #:* 450 P696;
*ISSN:* 0032-079X
This citation is provided courtesy of CAB International/CABI Publishing.

1483. **Rootzone processes and the efficient use of irrigation water.**
Clothier, Brent E and
Green, Steven R
*Agricultural Water Management* 25 (1): 1-12. (1994)
*NAL Call #:* S494.5.W3A3;
*ISSN:* 0378-3774
*Descriptors:* kiwifruit (Actinidiaceae)/ angiosperms/ dicots/ plants/ spermatophytes/ vascular plants/ horticulture/ hydraulic conductivity/ infiltration/ macropores/ plant water uptake
*Abstract:* The need for more-efficient agricultural use of irrigation water arises out of increased competition for water resources, and the greater pressure on irrigation practices to be environmentally friendly. In this review for the 25th Jubilee volume of Agricultural Water Management we focus on three rootzone processes that determine water-use efficiency in irrigation. Firstly, we discuss the role of macropores in preferentially-transporting irrigation water to depth during infiltration under both sprinkler and flood systems. It is suggested that more-uniform entry of irrigation water into the rootzone will result either by matching the sprinkler rate to the soil's matrix hydraulic conductivity, or by modifying the soil-surface's macroporosity prior to flood irrigation. Secondly, the environmentally-deleterious leaching of chemicals by irrigation is shown to be reduced if the applied fertilizer is first washed into dry soil by a small amount of water. This first pulse of water is drawn by capillarity into the soil's microporosity, and it carries with it the dissolved fertilizer which becomes resident there. These nutrients are then available for plant uptake, yet less prone to subsequent leaching by heavy rains. Meanwhile, initially-resident solutes in the dry soil, such as salts, will be more-effectively displaced by the infiltrating irrigation water. Finally, our time domain reflectometry (TDR) observations of the changing soil water content in the rootzone of a kiwifruit vine, and our direct measurements of sap flow within individual roots, both reveal that plants can rapidly change their spatial pattern of water uptake in response to the application of irrigation water. The prime uptake role of near-surface roots is highlighted. Consideration of all three of these rootzone processes reinforces the claim that more-efficient and environmentally-sustainable water management will arise through higher-frequency applications of smaller amounts of irrigation.


1484. **Ruminant methane emission measurements and estimates: From gut to globe.**
Clark, H.
*Proceedings of the New Zealand Society of Animal Production* 62: 206-210. (2002);
*ISSN:* 0370-2731
This citation is provided courtesy of CAB International/CABI Publishing.

1485. **Ruminant nutrition from an environmental perspective: Factors affecting whole-farm nutrient balance.**
Horn, H. H. van; Newton, G. L.; and Kunkle, W. E.
*Journal of Animal Science* 74 (12): 3082-3102. (1996)
*NAL Call #:* 49 J82;
*ISSN:* 0021-8812
This citation is provided courtesy of CAB International/CABI Publishing.

1486. **Safeguarding the welfare of livestock grazing on nature conservation sites.**
Grayson, F. W.
*Animal Welfare* 12 (4): 685-688. (2003);
*ISSN:* 0962-7286
This citation is provided courtesy of CAB International/CABI Publishing.

1487. **Salinisation: A major threat to water resources in the arid and semi-arid regions of the world.**
Williams, W D
*Lakes and Reservoirs: Research and Management* 4 (3-4): 85-91. (1999);
*ISSN:* 1320-5331
*Descriptors:* human (Hominidae)/ Animals/ Chordates/ Humans/ Mammals/ Primates/ Vertebrates/ agricultural wastewater discharge/ annual mean rainfall/ aquatic ecosystems/ arid regions/ biodiversity/ catchments/ dryland salinity/ ecological productivity/ economic impact/ environmental impact/ freshwaters/ global threat/ groundwaters/ human pressure/ irrigation/ natural salt lakes/ resource management/ river/ salinization: secondary/ semi arid regions/ social impact/ vegetation clearance/ water resources/ wetlands
*Abstract:* Semi-arid and arid regions (i.e. drylands with annual mean rainfall between 25 and 500 mm) cover approximately one-third of the world's land area and are inhabited by almost 400 million people. Because they are a resource in short supply, waters in drylands are under increasing human pressures, and many are threatened by rising salinities (salinisation) in particular. Rising salinities result from several causes. The salinities of many large natural salt lakes in drylands are rising as water is diverted from their inflows for irrigation and other uses. The excessive clearance of natural, deep-rooted vegetation from catchments and the discharge of saline agricultural wastewater causes the salinity of many freshwater lakes, wetlands and rivers to rise. The salinisation of some fresh waters is caused by rising saline groundwaters. And in some regions, increasing climatic aridity may be a cause of salinisation. Whatever the cause, salinisation has significant economic, social and environmental impacts. They are usually deleterious and often irreparable. Decreased biodiversity, changes in the natural character of aquatic ecosystems, and lower productivity are frequent ecological effects. In some dryland countries, salinisation is viewed as the single most important threat to water resources. However, the extent and importance of salinisation as a global threat has been greatly underestimated. Recognition of this is the first step in any attempt to manage it effectively. The aims of the present paper, therefore, are three-fold. First, it aims to define the problem and indicate its extent; second, it aims to outline the causes and effects of salinisation; third, it aims to highlight the social, economic and environmental costs and comment on management responses. An overarching aim is to draw attention to the importance of

salinisation as a phenomenon of global significance to waters in drylands.
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1488. **Salinity and its effect on growth, yield and some physiological processes of crop plants.**
El Saidi, M. T.
In: Strategies for improving salt tolerance in higher plants/ Jaiwal, P. K.; Singh, R. P.; and Gulati, A.
Enfield, N.H.: Science Pub., 1997; pp. 111-127.
*ISBN:* 1886106975
*NAL Call #:* QK753.S3S77-1997
*Descriptors:* gossypium hirsutum/ oryza sativa/ beta vulgaris/ brassica napus/ salinity/ hordeum vulgare/ growth/ crop yield/ plant physiology/ saline soils/ reclamation/ irrigation water/ vesicular arbuscular mycorrhizas/ soil fertility/ phosphorus/ trace elements/ nutrient availability/ root systems/ roots/ rhizobium/ azotobacter/ tolerance/ heat tolerance/ drought resistance/ nitrogen content/ drainage/ soil amendments/ fertilizers/ plant growth regulators/ irrigation/ literature reviews
This citation is from AGRICOLA.

1489. **Salmon recovery in the Pacific Northwest: A summary of agricultural and other economic effects.**
Aillery, Marcel P. and United States. Dept. of Agriculture. Economic Research Service.
Washington, D.C.: U.S. Dept. of Agriculture, Economic Research Service; 10 p.: ill., map. (1994)
*Notes:* Caption title. "July 1994." Includes bibliographical references (p. 9).
*NAL Call #:* 1--Ag84Ab-no.699
*Descriptors:* Salmon fisheries---Columbia River---Watershed/ Rare fishes---Columbia River---Watershed/ Wildlife conservation---Columbia River---Watershed
This citation is from AGRICOLA.

1490. **Salt tolerance and crop potential of halophytes.**
Glenn, E. P.; Brown, J. J.; and Blumwald, E.
*Critical Reviews in Plant Sciences* 18 (2): 227-255. (1999)
*NAL Call #:* QK1.C83;
*ISSN:* 0735-2689 [CRPSD3]
*Descriptors:* halophytes/ salicornia/ salt tolerance/ crops/ evolution/ osmosis/ vacuoles/ sodium chloride/ solutes/ cytoplasm/ ion transport/ sodium/ chloride/ tonoplast/ pyrophosphatases/ adenosinetriphosphatase/ irrigation/ water/ sea water/ hydrogen ions/ glycophytes/ field experimentation/ crop yield/ leaching/ water use efficiency/ forage/ seeds/ feeds/ leaves/ sap/ maximum yield/ literature reviews/ saline water/ salicornia bigelovii
This citation is from AGRICOLA.

1491. **Satellite eco-hydrology: A review.**
Meijerink, A. M. J.
*Tropical Ecology* 43 (1): 91-106. (2002);
*ISSN:* 0564-3295
This citation is provided courtesy of CAB International/CABI Publishing.

1492. **Satellite remote sensing for forestry planning: A review.**
Holmgren, P. and Thuresson, T.
*Scandinavian Journal of Forest Research* 13 (1): 90-110. (1998)
*NAL Call #:* SD1.S34;
*ISSN:* 0282-7581
This citation is provided courtesy of CAB International/CABI Publishing.

1493. **Satellite Remote Sensing of Wetlands.**
Ozesmi, SL and Bauer, ME
*Wetlands Ecology and Management* 10 (5): 381-402. (2002)
*NAL Call #:* QH541.5.M3 W472;
*ISSN:* 0923-4861
*Descriptors:* Conservation/ Remote sensing/ Wetlands/ Satellites/ Classification/ Literature reviews/ Environmental monitoring/ Baseline studies/ Nature conservation/ Land use/ Satellite sensing/ Ecosystem management/ Long term changes/ Short term changes/ Environmental protection/ Classification systems/ Surveying and remote sensing/ Wildlife management and recreation/ Habitat community studies/ Wetlands
*Abstract:* To conserve and manage wetland resources, it is important to inventory and monitor wetlands and their adjacent uplands. Satellite remote sensing has several advantages for monitoring wetland resources, especially for large geographic areas. This review summarizes the literature on satellite remote sensing of wetlands, including what classification techniques were most successful in identifying wetlands and separating them from other land cover types. All types of wetlands have been studied with satellite remote sensing. Landsat MSS, Landsat TM, and SPOT are the major satellite systems that have been used to study wetlands; other systems are NOAA AVHRR, IRS-1B LISS-II and radar systems, including JERS-1, ERS-1 and RADARSAT. Early work with satellite imagery used visual interpretation for classification. The most commonly used computer classification method to map wetlands is unsupervised classification or clustering. Maximum likelihood is the most common supervised classification method. Wetland classification is difficult because of spectral confusion with other landcover classes and among different types of wetlands. However, multi-temporal data usually improves the classification of wetlands, as does ancillary data such as soil data, elevation or topography data. Classified satellite imagery and maps derived from aerial photography have been compared with the conclusion that they offer different but complimentary information. Change detection studies have taken advantage of the repeat coverage and archival data available with satellite remote sensing. Detailed wetland maps can be updated using satellite imagery. Given the spatial resolution of satellite remote sensing systems, fuzzy classification, subpixel classification, spectral mixture analysis, and mixtures estimation may provide more detailed information on wetlands. A layered, hybrid or rule-based approach may give better results than more traditional methods. The combination of radar and optical data provide the most promise for improving wetland classification.
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1494. **Scale-dependent dispersal and distribution patterns of spiders in agricultural systems: A review.**
Samu, F.; Sunderland, K. D.; and Szinetár, C.
*Journal of Arachnology* 27 (1): 325-332. (1999)
*NAL Call #:* QL451.J6;
*ISSN:* 0161-8202
This citation is provided courtesy of CAB International/CABI Publishing.

1495. **Scale Issues in Hydrological Modelling: A Review.**
Bloeschl, G. and Sivapalan, M.
*Hydrological Processes* 9 (3-4): 251-290. (1995)
*NAL Call #:* GB651.H93;
*ISSN:* 0885-6087.
*Notes:* Conference: Workshop on Scale Issues in Hydrological/Environmental Modelling, Robertson, NSW (Australia), 30 Nov-2 Dec 1993; Source: Scale Issues in Hydrological/Environmental Modelling., 1995
*Descriptors:* hydrologic models/ dimensional analysis/ catchment basins/ variability/ research needs/ reviews/ parametric hydrology/ streams/ drainage patterns/ mathematical models/ hydrology/ catchment area/ river basins/ scale issues/ Dynamics of lakes and rivers
*Abstract:* A framework is provided for scaling and scale issues in hydrology. The first section gives some basic definitions. This is important as researchers do not seem to have agreed on the meaning of concepts such as scale or upscaling. 'Process scale', 'observation scale' and 'modelling (working) scale' require different definitions. The second section discusses heterogeneity and variability in catchments and touches on the implications of randomness and organization for scaling. The third section addresses the linkages across scales from a modelling point of view. It is argued that upscaling typically consists of two steps: distributing and aggregating. Conversely, downscaling involves disaggregation and singling out. Different approaches are discussed for linking state variables, parameters, inputs and conceptualizations across scales. The fourth section addresses the linkages across scales from a more holistic perspective dealing with dimensional analysis and similarity concepts. The main difference to the modelling point of view is that dimensional analysis and similarity concepts deal with complex processes in a much simpler fashion. Examples of dimensional analysis, similarity analysis and functional normalization in catchment hydrology are given. This section also briefly discusses fractals, which are a popular tool for quantifying variability across scales. The fifth section focuses on one particular aspect of this holistic view, discussing stream network analysis. The paper concludes with identifying key issues and gives some directions for future research.


1496. **Science in agroforestry.**
Sanchez, P A
*Agroforestry Systems* 30 (1-2): 5-55. (1995)
*NAL Call #:* SD387.M8A3;
*ISSN:* 0167-4366
*Descriptors:* Faidherbia albida (Leguminosae)/ angiosperms/ dicots/ plants/ spermatophytes/ vascular plants/ competition/ complexity/ crop yield/ intercropping/ profitability/ sustainability
*Abstract:* Agroforestry research is being transformed from a collection of largely descriptive studies into more scientific approaches, based on process-oriented research. The development of agroforestry as a science should be based on four key features: competition, complexity, profitability and sustainability. Managing the competition between trees and crops for light, water and nutrients to the farmers' benefit is the biophysical determinant of successful agroforestry systems. Simultaneous agroforestry systems are more susceptible to competition than sequential ones. A tree-crop interaction equation helps quantify competition vs. complementary effects on fertility. Alley cropping, a simultaneous agroforestry system, has limited applicability because the competition factor usually exceeds the beneficial fertility effects. The Faidherbia albida parkland, another simultaneous system, is almost always beneficial since the reverse phenology of F. albida minimizes competition while enhancing the fertility effect. Sequential systems such as relay intercropping and improved fallows also minimize competition but the processes responsible for crop yield increases are largely unquantified. New methodologies for reliably measuring complex below-ground interactions are being developed. Socioeconomic and ecological complexity are typical of agroforestry systems. Participatory, analytical and multidisciplinary characterization at different spatial scales is the required first step in effective agroforestry research. Diversity of products and services should be manipulated in a way that puts money in farmers' pockets. Domestication of indigenous trees with high-value products enhances profitability, particularly those that can be marketed as ingredients of several finished products. Policy research interventions are often necessary to help farmers during the initial years before trees become productive and exert their positive ecological functions. Profitable agroforestry systems are potentially sustainable, controlling erosion, enhancing biodiversity and conserving carbon, provided nutrient offtake is balanced by nutrient returns via litter and the strategic use of fertilizers, particularly phosphorus. A list of research gaps indicates where hard data are needed to provide a predictive understanding of the competition, complexity, profitability and sustainability aspects of agroforestry.


1497. **Scientific basis for estimating air emissions from animal feeding operations.**
National Research Council. Committee on Air Emissions from Animal Feeding Operations
Washington DC: National Academies Press; 122 p. (2002)
*Notes:* Title: Interim report;
*ISBN:* 0-309-08461-X
http://www.nap.edu/books/030908461X/html/
*Descriptors:* emissions/ animal feeding/ testing/ pollution control/ odor control

1498. **Scoping analysis and public involvement: Summary for the proposed standards for rangeland health and guidelines for livestock grazing.**
United States. Bureau of Land Management. New Mexico State Office.
Santa Fe, N.M.: U.S. Dept. of the Interior, Bureau of Land Management, New Mexico State Office; 69 p. (1996)
*Notes:* Cover title. Shipping list no.: 97-0020-P. "September 1996." Chiefly tables. SUDOCS: I 53.2:SCO 6.
*NAL Call #:* SF85.35.N6S36--1996
*Descriptors:* Range management---New Mexico---Planning/ Livestock---New Mexico---Management/ Grazing districts---New Mexico---Planning---Citizen participation
This citation is from AGRICOLA.

1499. **The secret life of compost: A "how-to" & "why" guide to composting: Lawn, garden, feedlot, or farm.**
Beck, Malcolm
Metairie, La.: Acres U.S.A.; x, 150 p.: ill. (1997)
*NAL Call #:* S661-.B42-1997;
*ISBN:* 0911311521 (trade paper); 091131153X (hardcover)
*Descriptors:* Compost
This citation is from AGRICOLA.

1500. **Section 319 National Monitoring Program: An Overview.**
Osmond, D. L.; Line, D. E.; Spooner, J.; North Carolina State University Water Quality Group; and U. S. Environmental Protection Agency.
North Carolina State University, 1997 (text/html)
*NAL Call #:* TD223 S44 1997
http://h2osparc.wq.ncsu.edu/319glossy/index.html
*Descriptors:* nonpoint source pollution/ environmental monitoring/ governmental programs and projects/ watershed management/ water quality/ land management/ best management practices/ pollution control/ case studies/ United States/ Section 319 National Monitoring Program/ BMPs
This citation is from AGRICOLA.

1501. **Section 319 National Monitoring Program Projects: 2000 Summary Report.**
Lombardo, L. A.; Grabow, G. L.; Tweedy, K. L.; Line, D. E.; Osmond, D. L.; Spooner, J.; North Carolina State University Water Quality Group; and U. S. Environmental Protection Agency.
North Carolina State University, 2000 (text/html)
http://h2osparc.wq.ncsu.edu/2000rept319/
*Descriptors:* nonpoint source pollution/ environmental monitoring/ governmental programs and projects/ watershed management/ water quality/ land management/ best management practices/ agricultural land/ case studies/ United States/ Section 319 National Monitoring Program/ BMPs

1502. **Section 319 National Monitoring Program Projects: 2001 Summary Report.**
Lombardo, L. A.; Grabow, G. L.; Line, D. E.; Osmond, D. L.; Spooner, J.; North Carolina State University Water Quality Group; and U. S. Environmental Protection Agency.
North Carolina State University, 2001 (text/html)
http://h2osparc.wq.ncsu.edu/319/2001rept/index.htm
*Descriptors:* nonpoint source pollution/ environmental monitoring/ governmental programs and projects/ watershed management/ water quality/ land management/ best management practices/ agricultural land/ case studies/ United States/ Section 319 National Monitoring Program/ BMPs

1503. **Section 319 Nonpoint Source National Monitoring Program: Successes and Recommendations.**
Lombardo, L. A.; Grabow, G. L.; Spooner, J.; Line, D. E.; Osmond, D. L.; Jennings, G. D.; North Carolina State University Water Quality Group; and U. S. Environmental Protection Agency.
North Carolina State University, 2000 (application/pdf)
http://www5.bae.ncsu.edu/programs/extension/wqg/section319/NMP%20Lessons%20Learned%2011_00.pdf
*Descriptors:* nonpoint source pollution/ environmental monitoring/ governmental programs and projects/ watershed management/ water quality/ land management/ best management practices/ pollution control/ case studies/ United States/ Section 319 National Monitoring Program/ BMPs

1504. **Section 319 Nonpoint Source Success Stories.**
U. S. Environmental Protection Agency [Also available as: EPA 841-S-94-004], 1994 (text/html)
*NAL Call #:* TD223 S43 1998
http://www.epa.gov/owow/nps/Success319/
*Descriptors:* Clean Water Act/ laws and regulations/ nonpoint source pollution/ runoff/ water pollution/ water quality/ watershed management/ best management practices/ environmental protection/ governmental programs and projects/ United States/ BMPs
*Abstract:* Demonstrates the successful implementation of the Section 319 Clean Water Act Nonpoint Source program. Provides examples of successful solutions to a variety of water quality problems caused by nonpoint source pollution. This citation is from AGRICOLA.

1505. **Section 319 Success Stories: Highlights of State and Tribal Nonpoint Source Programs.**
U. S. Environmental Protection Agency [Also available as: EPA 841-R-97-001], 1997.
*Notes:* Subtitle: Volume II (text/html)
http://www.epa.gov/owow/NPS/Section319II/
*Descriptors:* Clean Water Act/ laws and regulations/ nonpoint source pollution/ runoff/ water pollution/ water quality/ watershed management/ best management practices/ environmental protection/ governmental programs and projects/ United States/ BMPs
*Abstract:* Gives examples of success stories that have come with the maturation of state nonpoint source programs.

1506. **Section 319 Success Stories: Volume III.**
U. S. Environmental Protection Agency, Office of Water.
U. S. Environmental Protection Agency [Also available as: EPA-841-S-01-001], 2002 (application/pdf; text/html)
http://www.epa.gov/owow/nps/Section319III/pdf/319_all.pdf
*Descriptors:* Clean Water Act/ laws and regulations/ nonpoint source pollution/ runoff/ water pollution/ water quality/ watershed management/ best management practices/ environmental protection/ governmental programs and projects/ United States/ BMPs
*Abstract:* Success Stories: Volume III contains approximately two new stories per state, highlighting some of the additional successes achieved since the 1997 publication. These stories demonstrate better-defined water quality improvements, as well as growing partnerships and funding sources, as state 319 programs expand and states learn increasingly more from past 319 demonstration projects. Collectively, they represent only a fraction of the section 319 project successes.

1507. **Sediment quality criteria in use around the world.**
Burton, G Allen Jr
*Limnology* 3 (2): 65-75. (2002);
*ISSN:* 1439-8621
*Descriptors:* acid volatile sulfides/ organic carbon/ organism

(Organisms): bioindicator/ aquatic ecosystems/ benchmarks/ bioaccumulation/ ecological risk/ ecotoxicology/ laboratory toxicity/ sediment contamination/ sediment quality guidelines [SQGs]: criteria/ temporal variability
*Abstract:* There have been numerous sediment quality guidelines (SQGs) developed during the past 20 years to assist regulators in dealing with contaminated sediments. Unfortunately, most of these have been developed in North America. Traditionally, sediment contamination was determined by assessing the bulk chemical concentrations of individual compounds and often comparing them with background or reference values. Since the 1980s, SQGs have attempted to incorporate biological effects in their derivation approach. These approaches can be categorized as empirical, frequency-based approaches to establish the relationship between sediment contamination and toxic response, and theoretically based approaches that attempt to account for differences in bioavailability through equilibrium partitioning (EqP) (i.e., using organic carbon or acid volatile sulfides). Some of these guidelines have been adopted by various regulatory agencies in several countries and are being used as cleanup goals in remediation activities and to identify priority polluted sites. The original SQGs, which compared bulk chemical concentrations to a reference or to background, provided little insight into the ecosystem impact of sediment contaminants. Therefore, SQGs for individual chemicals were developed that relied on field sediment chemistry paired with field or laboratory-based biological effects data. Although some SQGs have been found to be relatively good predictors of significant site contamination, they also have several limitations. False positive and false negative predictions are frequently in the 20% to 30% range for many chemicals and higher for others. The guidelines are chemical specific and do not establish causality where chemical mixtures occur. Equilibrium-based guidelines do not consider sediment ingestion as an exposure route. The guidelines do not consider spatial and temporal variability, and they may not apply in dynamic or larger-grained sediments. Finally, sediment chemistry and bioavailability are easily altered by sampling and subsequent manipulation processes, and therefore, measured SQGs may not reflect in situ conditions. All the assessment tools provide useful information, but some (such as SQGs, laboratory toxicity and bioaccumulation, and benthic indices) are prone to misinterpretation without the availability of specific in situ exposure and effects data. SQGs should be used only in a "screening" manner or in a "weight-of-evidence" approach. Aquatic ecosystems (including sediments) must be assessed in a "holistic" manner in which multiple components are assessed (e.g., habitat, hydrodynamics, resident biota, toxicity, and physicochemistry, including SQGs) by using integrated approaches.


1508. **Sediment quality values (SQVs) and ecological risk assessment (ERA).**
Chapman, Peter M and Mann, Gary S
*Marine Pollution Bulletin* 38 (5): 339-344. (1999)
*NAL Call #:* GC1000.M3;
*ISSN:* 0025-326X
*Descriptors:* contaminants: bioavailability/ dredging/ ecological risk assessment/ environmental contamination/ sediment quality
*Abstract:* A wide variety of sediment quality values (SQVs) have been promulgated. Ecological risk assessment (ERA) provides a framework for objectively and systematically evaluating the risks posed by environmental contamination to ecological resources. SQV application to ERA should be restricted to the initial problem formulation stage where they can be used either alone (i.e., in jurisdictions with accepted SQVs) or in a weight-of-evidence approach (i.e., multiple SQV types; in jurisdictions without accepted SQVs) to screen out contaminants posing negligible risks to ecological receptors.


1509. **Sediment transport, aqueous bedform stability and morphodynamics under unidirectional current: A brief overview.**
Mazumder, R.
*Journal of African Earth Sciences* 36 (1-2): 1-14. (Jan.-Feb. 2003);
*ISSN:* 0899-5362.
*Notes:* Number of References: 132
*Descriptors:* Earth Sciences/ bedform stability/ morphodynamics/ turbulence/ sediment transport/ boundary layer/ stage plane beds/ turbulent boundary layers/ current ripples/ equilibrium morphology/ subaqueous dunes/ fine sand/ heterogeneous sediment/ stratification types/ fluvial sandstone/ flume experiments
*Abstract:* Extensive research on the stability and morphodynamics of aqueous bedforms over the past four decades reveals the existance of seven bedform states (ripples, lower stage plane beds, pebble clusters, bedload sheets, dunes, upper stage plane beds and antidunes). Their stability and morphology is a function of mean flow velocity/non-dimensional bed shear stress and sediment-size. These bedform states are distinguishable from one other by their morphology, dimension, and sediment transport rate. Each bedform state is characterized by distinct physical process(es), and transitional bedform states (washed-out-ripples and dunes) are consequences of their temporal, spatial and dimensional variabilities. The physical processes associated with various aqueous bedform states and transitional bedforms are discussed in this paper, in order to gain insights into their stability and morphodynamics in different sediment-sizes. (C) 2003 Elsevier Science Ltd. All rights reserved.


1510. **Seed Banks and Seed Population Dynamics of Halophytes.**
Ungar, I. A.
*Wetlands Ecology and Management* 9 (6): 499-510. (2001)
*NAL Call #:* QH541.5.M3 W472;
*ISSN:* 0923-4861.
*Notes:* Special Issue: Halophytes - a Resource for the future; DOI: 10.1023/A:1012236829474
*Descriptors:* Seed banks/ Population dynamics/ Halophytes/ Gradients/ Salinity effects/ Seeds/ Aquatic plants/ Environmental protection/ Nature conservation/ Salinity tolerance/ Literature reviews/ Geographical distribution/ Wetlands/ Salt Marshes/ Zones/ Plant Populations/ Spatial Distribution/ Temporal Distribution/ Salt Tolerance/ Reviews/ Plants general/ Population dynamics/ Viruses, Bacteria, Protists, Fungi and Plants/ Water and plants

*Abstract:* In this review I will describe the importance of seed banks and the population dynamics of seeds on the distribution of species in saline habitats. The main questions being examined in this review include: 1. Does the seed bank represent the flora of the entire salinity gradient or is it restricted to the species in each zonal community? 2. Is the size and species composition of the persistent seed bank regulated by the degree of salt stress in habitats along an environmental gradient? 3. Does the population dynamics of seeds influence the temporal and spatial distribution of plant species in saline habitats? Seed banks may be transient or persistent depending upon the physiological responses of species and the soil environment in which the seeds are found. The formation of zonal communities in salt marsh environments is affected by changes in soil salinity and flooding along an elevational gradient. Population dynamics of seeds have been found to determine the spatial and temporal distribution of species along salinity gradients. The flora and relative density of species of zonal communities are significantly dependent upon the stress tolerance of species at different stages of development and the presence of transient or persistent seed banks. The occurrence of a seed bank is related to the salinity tolerance of species at the germination stage of development, a seeds ability to tolerate hypersaline conditions and flooding, and whether or not species are able to maintain a persistent seed bank until hypersaline conditions are alleviated.


1511. **Seed banks: Memory in soil.**
Cavers, P. B.
*Canadian Journal of Soil Science* 75 (1): 11-13. (1995)
*NAL Call #:* 56.8 C162;
*ISSN:* 0008-4271


1512. **Seeking the root of insect resistance to transgenic plants.**
Tabashnik, B. E.
*Proceedings of the National Academy of Sciences* 94 (8): 3488-3490. (Apr. 1997);
*ISSN:* 0027-8424
*Descriptors:* reviews/ transgenic plants/ Bacillus thuringiensis/ pest resistance/ insecticides/ toxins/ Plants/ Pathology
*Abstract:* It is humbling and instructive that the most exquisitely specific group of insecticides known originates not from a laboratory, but instead from the common soil bacterium Bacillus thuringiensis (Bt). Insecticidal crystal proteins produced by Bt kill insects by binding to and disrupting their midgut membranes. Each of the numerous strains of Bt produces a characteristic set of crystal proteins. Each of these toxins is lethal to certain insects, yet does little or no harm to most other organisms, including people, wildlife, and even other insects. Bt was first formally described from Thuringia, Germany, in 1911 and has been available in commercial formulations for insect control since the 1930s; yet until recently, it remained a minor component of pest management. Three factors set the stage for the emerging importance of Bt: evolution of resistance to insecticides in more than 500 species of insects and mites, rising concerns about environmental hazards of conventional insecticides, and breakthroughs in biotechnology. Genetic engineering has created transgenic varieties of many crops that express Bt toxins; such cultivars of transgenic corn, cotton, and potatoes were grown on a large scale in the United States for the first time during 1996. Transgenic plants armed with Bt toxins are defended against some of the most notorious pests, which reduces the need for insecticidal sprays. Because Bt is not toxic to arthropod natural enemies, opportunities for biological control are enhanced and the secondary pest outbreaks often caused by conventional insecticides are avoided. Thus, this new technology could yield enormous benefits for food production and environmental quality worldwide. Will the advent of Bt-expressing transgenic plants herald a new era of environmentally benign insect control? Or will the pests quickly adapt?


1513. **Seepage from earthern animal waste ponds and lagoons: An overview of research results and state regulations.**
Parker, D. B.; Schulte, D. D.; and Eisenhauer, D. E.
*Transactions of the ASAE* 42 (2): 485-493. (1999)
*NAL Call #:* 290.9-Am32T;
*ISSN:* 0001-2351 [TAAEAJ]
*Descriptors:* animal wastes/ seepage/ infiltration/ ponds/ lagoons/ regulations/ water quality/ pollution control
*Abstract:* Wastewater seepage from earthen animal waste lagoons and storage ponds can contaminate groundwater with nutrients and pathogens. For almost 30 years, the subject has been the focus of laboratory and field research projects designed to (1) measure if and how much earthen ponds and lagoons leak, (2) determine how different soil types affect seepage rates, and (3) evaluate the magnitudes and mechanisms of sealing from animal waste. In this article we present a research review performed to determine how researchers have attempted to answer these questions and how well they have been answered. We discuss weaknesses in the body of knowledge and present further research and educational needs. We also performed a review of 14 state regulations to assess and compare how different states govern seepage from ponds and lagoons. Six states regulate the maximum allowable seepage rate from ponds and lagoons (values ranging from 0.042 to 0.63 cm/day) while another six states regulate the maximum hydraulic conductivity of earthen liners (values ranging from 0.086 to 0.0086 cm/day). The two remaining states regulate neither. The results of this research and regulatory, review demonstrate that there is still much to be learned about seepage from animal waste ponds and lagoons. We suggest that a risk-based approach to regulating seepage may be appropriate in the future.


1514. **Selected procedures for the monitoring of polar pesticides and related microcontaminants in aquatic samples.**
Brouwer, E R; Kofman, S; and Brinkman, U A T
*Journal of Chromatography A* 703 (1-2): 167-190. (1995)

*NAL Call #:* QD272.C4J68;
*ISSN:* 0021-9673
*Descriptors:* analytical method/ surface water/ tap water/ water pollution


1515. **Selecting and testing indicators of forest health.**
Lewis, T. E.; Cassell, D. L.; Cline, S. P.; Alexander, S. A.; Stolte, K. W.; and Smith, W. D.
In: North American Workshop on Monitoring for Ecological Assessment of Terrestrial and Aquatic Ecosystems = Taller Norteamericano Sobre Monitoreo para la Evaluacion Ecologica de Ecosistemas Terrestres y Acuaticos. (Held 18 Sep 1995-22 Sep 1995 at Mexico City, Mexico.) Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station; pp. 140-156; 1996.
*NAL Call #:* aSD11.A42-no.284
*Descriptors:* forest health/ biological indicators/ monitoring/ environmental assessment/ forest ecology/ ecosystems/ government/ cooperation/ quality controls/ organizations/ sustainability/ forest management/ social values/ wildlife/ habitats/ productivity/ environmental management/ spatial distribution/ environmental impact/ quantitative techniques/ literature reviews
This citation is from AGRICOLA.

1516. **Selecting indicator species to monitor ecological integrity: A review.**
Carignan, V. and Villard, M. A.
*Environmental Monitoring and Assessment* 78 (1): 45-61. (2002)
*NAL Call #:* TD194.E5;
*ISSN:* 0167-6369
*Descriptors:* Environment management/ Bioindicators/ Conservation/ Environmental monitoring/ Biological diversity/ Pollution monitoring/ Indicator species/ Pollution indicators/ Test organisms/ Marine organisms/ Estuarine organisms/ Animal physiology/ Life history/ Population structure/ Population dynamics/ Analytical techniques/ Ecosystem management/ Water quality control/ Pollution control/ Water pollution/ Sediment pollution/ Aquatic environment/ Reviews/ Environmental action/ Methods and instruments/ Instruments/ Methods/ Pollution monitoring and detection
*Abstract:* We review critical issues that must be considered when selecting indicator species for a monitoring program that aims to maintain or restore ecological integrity. First, we examine the pros and cons of different management approaches on which a conservation program can be based and conclude that ecosystem management is most appropriate. We then identify potential indicators of ecological integrity at various levels of the ecosystem, with a particular emphasis on the species level. We conclude that, although the use of indicator species remains contentious, it can be useful if (1) many species representing various taxa and life histories are included in the monitoring program, (2) their selection is primarily based on a sound quantitative database from the focal region, and (3) caution is applied when interpreting their population trends to distinguish actual signals from variations that may be unrelated to the deterioration of ecological integrity. Finally, we present and discuss different methods that have been used to select indicator species.


1517. **Selenium speciation in soils and plants.**
Fox, P. M.; LeDuc, D. L.; Hussein, H.; Lin, Z. Q.; and Terry, N.
In: Biogeochemistry of environmentally important trace elements/ Cai, Y. and Braids, O. C., 2002; pp. 339-354.
*ISBN:* 0-8412-3805-7


1518. **Separation of manure solids from simulated flushed manures by screening or sedimentation.**
Powers, W. J.; Montoya, R. E.; Van Horn, H. H.; Nordstedt, R. A.; and Bucklin, R. A.
*Applied Engineering in Agriculture* 11 (3): 431-436. (May 1995)
*NAL Call #:* S671.A66;
*ISSN:* 0883-8542
*Descriptors:* cows/ cattle manure/ solid wastes/ cattle slurry/ separation/ sieving/ sedimentation/ nitrogen/ phosphorus/ simulation/ literature reviews/ United States
*Abstract:* Feces and urine were collected separately from individual cows fed corn silage-based (50% of dry matter) diets which were supplemented with distillers dried grains plus solubles or soybean meal to be 14 or 18% crude protein (CP). Fecal samples from 30 cows were screened using wet sieving and vibrating screens (nested in series); sizes were 3.35, 2.00, 1.40, 1.00, and 0.50 mm. Effluent passing the screens contained 60.2% of total solids (TS), 86.3% of nitrogen (N), and 94.3% of phosphorus (P). Solids caught on the five screens (largest to smallest) accounted for the following percentages of materials: 14.6, 9.4, 2.8, 4.3, 8.6% of TS; 5.7, 3.1, 0.8, 1.3, 2.8% of N; 2.2, 1.2, 0.3, 0.6, 1.5% of P. In another study, a 100 g composite sample of urine and feces from each of 44 cows, mixed in proportion to the amount excreted, was diluted to 1 L with water and allowed to settle for 1 h in a graduated cylinder. Supernatant and sediment were separated by decanting. Supernatants were analyzed for N content, sediments for TS content, and these amounts were subtracted from analyzed contents of samples to obtain reciprocal fractions. Overall, the sediment contained 66% of TS and 45% of N. Estimates of sediment amount made at 5, 10, 20, 40, and 60 min by recording best-defined line between supernatant and sediment suggested sedimentation was 89% completed by 5 min. In a second sedimentation study, simulated manure flushwaters (0.5, 1.0, and 1.5% TS) were treated with additives as follows: (1) 0.75 g of CaCO3 plus 0.50 mL Fe2(SO4)3 solution/L, (2) 0.75 g of CaO plus 0.50 mL Fe2(SO4)3 solution/L, (3) 0.50 mL Fe2(SO4)3 solution/L plus five drops of a commercial polymer, and (4) control (no additives). Precipitates with CaCO3 and CaO treatments contained 92% of the TS, 69% of the N, and 31% of the total potassium (K); the CaO treatment precipitated appreciably more P (93% of total) than other treatments; and treatment with Fe2(SO4)3 plus polymer precipitated the least TS and N. These data indicated a potential to remove more manure solids and N from flushed manure by sedimentation than by screening.
This citation is from AGRICOLA.

1519. **Sequestration of carbon and changes in soil quality under conservation tillage on light-textured soils in Australia: A review.**
Chan, K. Y.; Heenan, D. P.; and So, H. B.
*Australian Journal of Experimental Agriculture* 43 (4): 325-334. (2003)
*NAL Call #:* 23-Au792;
*ISSN:* 0816-1089
This citation is provided courtesy of CAB International/CABI Publishing.

1520. **Sheep grazing and riparian and watershed management.**
Glimp, H. A. and Swanson, S. R.
*Sheep Research Journal* Special issue: 65-71. (1994)
*NAL Call #:* SF371.R47
This citation is provided courtesy of CAB International/CABI Publishing.

1521. **Sheep grazing as a range improvement tool.**
Havstad, K. M.
*Sheep Research Journal*: 72-78. (1994)
*NAL Call #:* SF371.R47;
*ISSN:* 1057-1809.
*Notes:* Special issue: Role of sheep grazing in natural resource management. Includes references.
*Descriptors:* sheep/ range management/ grazing intensity/ grazing effects/ herbivores/ plant succession/ controlled grazing/ literature reviews
This citation is from AGRICOLA.

1522. **Significance and application of microbial toxicity tests in assessing ecotoxicological risks of contaminants in soil and sediment.**
Beelen, P. van and Doelman, P.
*Chemosphere* 34 (3): 455-499. (Feb. 1997)
*NAL Call #:* TD172.C54;
*ISSN:* 0045-6535 [CMSHAF]
*Descriptors:* polluted soils/ sediment/ pollutants/ toxicity/ tests/ bioassays/ contaminants/ soil flora/ soil enzymes/ biological activity in soil/ respiration/ mineralization/ microbial degradation/ nitrogen/ carbon/ microbial activities/ literature reviews
This citation is from AGRICOLA.

1523. **Simulation of pesticide persistence in the field on the basis of laboratory data: A review.**
Beulke, S.; Dubus, I. G.; Brown, C. D.; and Gottesburen, B.
*Journal of Environmental Quality* 29 (5): 1371-1379. (Sept. 2000-Oct. 2000)
*NAL Call #:* QH540.J6;
*ISSN:* 0047-2425 [JEVQAA]
*Descriptors:* pesticides/ persistence/ degradation/ soil/ simulation models/ environmental fate/ model evaluation
*Abstract:* Simulations of pesticide fate in soils are often based on persistence models developed nearly 30 years ago. These models predict dissipation in the field on a daily basis by correcting laboratory degradation half-lives for actual soil temperature and moisture content. They have been extensively applied, but to date no attempt has been made to evaluate existing studies in a consistent, quantitative way. This paper reviews 178 studies comparing pesticide soil residues measured in the field with those simulated by persistence models. The simulated percentage of initial pesticide concentration at the time of 50% measured loss was taken as a common criterion for model performance. The models showed an overall tendency to overestimate persistence. Simulated values ranged from 12 to 96% of initial pesticide concentrations with a median of 60%. Simulated soil residues overestimated the target value (50% of initial) by more than a factor of 1.25 in 44% of the cases. An underestimation by more than a factor of 1.25 was found in only 17% of the experiments. Discrepancies between simulated and observed data are attributed to difficulties in characterizing pesticide behavior under outdoor conditions using laboratory studies. These arise because of differences in soil conditions between the laboratory and the field and the spatial and temporal variability of degradation. Other possible causes include losses in the field by processes other than degradation, deviations of degradation from first-order kinetics, discrepancies between simulated and actual soil temperature and moisture content, and the lack of soil-specific degradation parameters. Implications for modeling of pesticide behavior within regulatory risk assessments are discussed.
This citation is from AGRICOLA.

1524. **Simulation of snowmelt erosion using the EROSION 3D model.**
Weigert, Astrid; Wenk, Gerald; Ollesch, Gregor; and Fritz, Heiko
*Journal of Plant Nutrition and Soil Science* 166 (1): 128-130. (2003)
*NAL Call #:* 384 Z343A;
*ISSN:* 1436-8730
*Descriptors:* snowmelt erosion/ soil properties: water content


1525. **Simulation of subsurface flow constructed wetlands: Results and further research needs.**
Langergraber, G.
*Water Science and Technology* 48 (5): 157-166. (2003)
*NAL Call #:* TD420.A1P7;
*ISSN:* 0273-1223.
*Notes:* 16 references.
Publisher: I W a Publishing
*Descriptors:* Environment/ Ecology/ CW2D/ modelling/ multi component reactive transport/ numerical simulation/ research need/ subsurface flow constructed wetlands
*Abstract:* Simulation of constructed wetlands has two main tasks: to obtain a better understanding of the processes in constructed wetlands, and to check and optimise existing design criteria. This paper shows simulation results for two indoor pilot-scale constructed wetlands for wastewater and surface water treatment respectively. The results presented and discussed are mainly focussed on the hydraulic behaviour of the constructed wetland systems. In addition results of reactive transport simulations with CW2D are shown. The multi-component reactive transport model CW2D (Constructed Wetlands 2 Dimensional) was developed to model transport and reactions of the main constituents of wastewater (organic matter, nitrogen, and phosphorus) in subsurface flow constructed wetlands. For the pilot-scale constructed wetlands a calibration of the flow model was possible and therefore the results of the reactive transport simulations with CW2D fit the measured data well. The further research needs regarding the simulation of subsurface flow constructed wetlands are discussed.

1526. **Site selection of animal operations using air quality criteria.**
Jacobson, L. D.; Wood, S. L.; Schmidt, D. R.; Heber, A. J.; Bicudo, J. R.; and Moon, R. D.
In: White papers on animal agriculture and the environment/ National Center for Manure & Animal Waste Management; Midwest Plan Service; and U.S. Department of Agriculture; Raleigh, NC: National Center for Manure & Animal Waste Management, 2001.
*NAL Call #:* TD930.2-.W45-2002
*Descriptors:* Agricultural wastes---Environmental aspects---United States

1527. **Slope stabilization and erosion control: A bioengineering approach.**
Morgan, R. P. C. and Rickson, R. J.; 288 p. (1994); *ISBN:* 0-419-15630-5
This citation is provided courtesy of CAB International/CABI Publishing.

1528. **Sludge Treatment, Utilization, and Disposal.**
Bowen, P. T.; Jackson, M. K.; Corbitt, R. A.; and Gonce, N.
*Water Environment Research* 65 (6): 360-368. (1993)
*NAL Call #:* TD419.R47
*Descriptors:* Literature review/ Reviews/ Sludge disposal/ Sludge treatment/ Sludge utilization/ Wastewater disposal/ Wastewater treatment/ Chemical treatment/ Composting/ Incineration/ Land disposal/ Ocean dumping/ Recycling/ Sludge drying/ Sludge stabilization/ Sludge thickening/ Wastewater treatment processes/ Ultimate disposal of wastes
*Abstract:* Comprehensive reviews of sludge management have been published. Sludge loading facilities, and agricultural use of sludge is described in the United states, and internationally, the incineration, dewatering and agricultural utilization and disposal of sludge has been investigated. The microbiological and organic properties of sludges have been extensively reviewed and the metals content of sludge and analytical procedures for determining the properties of sludges have been investigated. Many methods are available for the dewatering, thickening, and drying of sludge. These methods fall under the broad categories of presses, centrifuges, and pressure filters. A decision-making process for choosing the appropriate dewatering technology has been described. Sludge stabilization methods that are reviewed include composting and chemical treatments. Ultimate disposal methods for sludge may involve, incineration, ocean/river dumping, land application, recycling, and agricultural uses. Dewatering technologies for alum and polymer sludges, metal finishing slurries, and for pulp and paper mill sludges have also been investigated. (Geiger-PTT)
© Cambridge Scientific Abstracts (CSA)

1529. **Slurry application technology: A review of methods.**
Frick R
In: FAT - Berichte, 441; Tanikon, Switzerland: Der Forschungsanstalt, 1994. 12 p.
*Notes:* Also published in French as Rapports FAT No. 441
This citation is provided courtesy of CAB International/CABI Publishing.

1530. **Small-scale spatial and temporal variance in the concentration of heavy metals in aquatic sediments: A review and some new concepts.**
Birch, G. F.; Taylor, S. E.; and Matthai, C.
*Environmental Pollution* 113 (3): 357-372. (2001)
*NAL Call #:* QH545.A1E52;
*ISSN:* 0269-7491 [ENPOEK]
*Descriptors:* heavy metals/ sediment/ aquatic environment/ spatial variation/ temporal variation
This citation is from AGRICOLA.

1531. **A sociological analysis of site-specific management.**
Nowak P; Pierce FJ; and Sadler EJ
In: The state of site specific management for agriculture, 1997; pp. 397-422.
*Notes:* 24 ref
This citation is provided courtesy of CAB International/CABI Publishing.

1532. **Software for pest-management science: Computer models and databases from the United States Department of Agriculture - Agricultural Research Service.**
Wauchope, R. D.; Ahuja, L. R.; Arnold, J. G.; Bingner, R.; Lowrance, R.; Genuchten, M. T. van; and Adams, L. D.
*Pest Management Science* 59 (6-7): 691-698. (June 2003-July 2003)
*NAL Call #:* SB951 .P47;
*ISSN:* 1526-498X.
*Notes:* Number of References: 51
*Descriptors:* Entomology/ Pest Control/ simulation model/ database/ pesticide transport/ pesticide fate/ non point pollution/ risk assessment/ runoff/ leaching/ erosion/ riparian buffer/ watershed/ simulation/ transport/ water/ pesticides/ parameters/ systems/ scale
*Abstract:* We present an overview of USDA Agricultural Research Service (ARS) computer models and databases related to pest-management science, emphasizing current developments in environmental risk assessment and management simulation models. The ARS has a unique national interdisciplinary team of researchers in surface and sub-surface hydrology, soil and plant science, systems analysis and pesticide science, who have networked to develop empirical and mechanistic computer models describing the behavior of pests, pest responses to controls and the environmental impact of pest-control methods. Historically, much of this work has been in support of production agriculture and in support of the conservation programs of our 'action agency' sister, the Natural Resources Conservation Service (formerly the Soil Conservation Service). Because we are a public agency, our software/database products are generally offered without cost, unless they are developed in cooperation with a private-sector cooperator. Because ARS, is a basic and applied research organization, with development of new science as our highest priority, these products tend to be offered on an 'as-is' basis with limited user support except for cooperating R&D relationship with other scientists. However, rapid changes in the technology for information analysis and communication continually challenge our way of doing business.
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1533. **Soil aggregate stability: A review.**
Amezketa, E.
*Journal of Sustainable Agriculture* 14 (2/3): 83-151. (1999)
*NAL Call #:* S494.5.S86S8;
*ISSN:* 1044-0046 [JSAGEB]
*Descriptors:* aggregates/ soil structure/ sustainability/ soil formation/ stability/ quantitative analysis/

erodibility/ erosion/ measurement/ techniques/ sampling/ estimation/ crusts/ soil chemistry/ age of soil/ soil amendments/ cropping systems/ crops/ literature reviews/ sample processing
*Abstract:* Soil aggregate stability is a crucial soil property affecting soil sustainability and crop production. A broad outline of the processes and agents of aggregate formation and aggregate stabilization are presented and discussed in this review. Aggregate stability is difficult to quantify and interpret. The aim of aggregate stability tests is to give a reliable description and ranking of the behavior of soils under the effect of water, wind and management. Numerous methods have been used to determine aggregate stability with varying success. The different methodologies complicate the comparison among aggregate stability data. It is also difficult to obtain a consistent correlation between aggregate stability and other important soil properties such as soil erodibility or crusting potential. This paper reviews the different methods of measurement of soil aggregate stability used in the literature, paying attention to the conditions of sample collection in the field and sample preparation and treatments in the laboratory. A unified methodological framework including the most interesting aspects of existing methods is suggested. The possibility of using aggregate stability data as an estimation of soil erodibility is also discussed.
This citation is from AGRICOLA.

1534. **Soil and crop responses to soil tillage systems: A Polish perspective.**
Malicki, Leszek; Nowicki, Janusz; and Szwejkowski, Zbigniew
*Soil and Tillage Research* 43 (1-2): 65-80. (1997)
*NAL Call #:* S590.S48;
*ISSN:* 0167-1987
*Descriptors:* erosion
*Abstract:* An analysis of the literature of the subject shows that soil tillage only has a short-term direct influence on soil properties and it exerts its influence on cropping, first of all indirectly, through its effects on yield forming factors. Consequently, on well cultivated soils in flat areas and in the conditions of rational crop rotation, fertilization and plant protection, it is possible to simplify tillage significantly without adverse economical or ecological results. The limitation of tillage, up to direct sowing, will be indispensable in erosion areas. However, the presence of defective soils and some meteorological conditions require conventional plough tillage.
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1535. **Soil and water quality: An agenda for agriculture.**
National Research Council. Committee on Long-Range Soil and Water Conservation Policy
Washington DC: National Academies Press; 542 p. (1993);
*ISBN:* 0-309-04933-4
http://www.nap.edu/openbook/0309045347/html/
*Descriptors:* agriculture/ soil erosion/ soil degradation/ water quality/ soil management

1536. **Soil biochemical properties as indices of performance and sustainability of effluent irrigation systems in New Zealand: A review.**
Speir, T W
*Journal of the Royal Society of New Zealand* 32 (4): 535-553. (2002);
*ISSN:* 0303-6758
*Descriptors:* nutrients/ plant (Plantae)/ Plants/ biochemical properties/ denitrification/ enzyme activities/ industrial effluents/ land management/ methodological limitations/ microbial biomass/ plant growth/ sewage effluents/ soil heaths/ treatment sustainability/ water supply
*Abstract:* In New Zealand, there have been a number of investigations of the effects on soil biochemical properties of land application of industrial and sewage effluents. In recent years, the rationale for determining these properties has been to ascertain if they have a potential role as early warning indicators of adverse effects of effluent irrigation on treatment sustainability and/or soil health. In this review, I summarise the findings from these studies and attempt to establish whether the data do support this role. Assessment of biochemical effects of the application of effluents to land under crops, forest, or scrub is complicated by previous land management and by site characteristics. Consequently, only investigations of effluent application onto pastoral soils have allowed an assessment of the potential value of soil biochemical properties as early-warning indicators of adverse effects. Generally, these studies have shown that effluent application has had a beneficial effect on soil properties and plant growth and this is reflected by enhanced soil biochemical activities. Where an adverse effect did occur in response to a drastic change of effluent amount and composition, soil biochemical properties were markedly reduced. However, soil chemical properties and aggregate stability were unaffected. This suggests, therefore, that there could be a role for biochemical properties as indices of performance and sustainability of land-based effluent irrigation systems. However, with most studies showing that most effluent application is beneficial, such a role may be limited to situations where the effluent is to be applied at an amount, or has a composition that has not been previously tested. The main conclusion from this review is that when irrigation schemes have been running for a number of years and are functioning well, soil biochemical properties reflect the soil health enhancements provided by the water and nutrients added. Such enhancements are generally manifested slowly and, therefore, monitoring is required over a longer duration than has occurred in several of the studies examined. Adverse effects attributable to effluent irrigation are more difficult to recognise and interpret unless a drastic change has occurred, due mainly to methodological limitations and our lack of understanding of the true meaning of what we are measuring or its relevance to soil functioning. Until our understanding improves markedly, a predictive role for these properties as an early warning of adverse effects of effluent irrigation will remain elusive.
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1537. **Soil biology: Effects on soil quality.**
Hatfield, Jerry L. and Stewart, B. A.
Boca Raton: Lewis Publishers; 169 p.: ill.; Series: Advances in soil science (Boca Raton, Fla.). (1994)
*NAL Call #:* QH84.8.S6315--1994;
*ISBN:* 0873719271
*Descriptors:* Soil biology/ Soils---Quality
This citation is from AGRICOLA.

1538. **Soil Biology Primer.**
Ingham, E. R.; Moldenke, A. R.; and Edwards, C. A.
Ankeny, Iowa: Soil and Water Conservation Society. (2000)
*Notes:* Revised edition
*Descriptors:* soil/ agricultural land/ soil quality/ air quality/ water quality/ soil microorganisms

1539. **Soil carbon sequestration for improved land management.**
Food and Agriculture Organization; World Soil Resources Reports No.96, 2001. xi, 57 p.
*Notes:*
*ISSN:* 0532-0488
This citation is provided courtesy of CAB International/CABI Publishing.

1540. **Soil community composition and ecosystem processes: Comparing agricultural ecosystems with natural ecosystems.**
Neher, D A
*Agroforestry Systems* 45 (1-3): 159-185. (1999)
*NAL Call #:* SD387.M8A3;
*ISSN:* 0167-4366
*Descriptors:* nitrogen/ pesticide/ plant (Plantae)/ soil organism (Organisms)/ Plants/ agroforestry/ decomposition/ ecosystem processes/ fertilizer/ mineralization/ nutrition/ phenology/ plant productivity/ soil community composition/ water
*Abstract:* Soil organisms play principal roles in several ecosystem functions, i.e. promoting plant productivity, enhancing water relations, regulating nutrient mineralisation, permitting decomposition, and acting as an environmental buffer. Agricultural soils would more closely resemble soils of natural ecosystems if management practices would reduce or eliminate cultivation, heavy machinery, and general biocides; incorporate perennial crops and organic material; and synchronise nutrient release and water availability with plant demand. In order to achieve these goals, research must be completed to develop methods for successful application of organic materials and associated micro-organisms, synchronisation of management practices with crop and soil biota phenology, and improve our knowledge of the mechanisms linking species to ecosystem processes.


1541. **Soil degradation by erosion.**
Lal, R.
*Land Degradation and Development* 12 (6): 519-539. (2001)
*NAL Call #:* S622.L26;
*ISSN:* 1085-3278
This citation is provided courtesy of CAB International/CABI Publishing.

1542. **Soil detachment in the physically based soil erosion process: A review.**
Owoputi, L. O. and Stolte, W. J.
*Transactions of the ASAE* 38 (4): 1099-1110. (July 1995-Aug. 1995)
*NAL Call #:* 290.9-Am32T;
*ISSN:* 0001-2351 [TAAEAJ]
*Descriptors:* interrill erosion/ rill erosion/ soil movement/ equations/ erodibility/ rain/ literature reviews
*Abstract:* This article presents a broad review of the physical process of soil erosion, but with the main focus on the approaches, forms of equations, and techniques commonly adopted to quantify the rate of soil detachment in an erosion event. While presenting some of the commonly used equations, the emphasis is placed on the physical significance of the associated parameters and the general weaknesses of the equations. The two main parameters of the existing equations, namely the critical condition for erosion and soil erodibility, are evaluated in this article with respect to the factors affecting them. In addition, the impacts of flow and moisture variations in the soil that are commonly neglected while defining soil erosion components and parameters are also discussed. The conclusion of this article is that there is a need to derive a more fundamental equation for predicting the soil detachment rate. As a step in that direction, a conceptual clarification of the mechanism of soil detachment, is presented. Some fundamental concepts that may be useful in deriving a more physically and engineering-based soil detachment equation are also introduced.
This citation is from AGRICOLA.

1543. **Soil ecosystem properties, microbial diversity, and ecosystem assessments.**
Tate, R. L. III and Rogers, B. F.
In: Ecological significance of the interactions among clay minerals, organic matter and soil biota: 3rd Symposium on Soil Mineral-Organic Matter-Microorganism Interactions and Ecosystem Health. (Held 22 May 2000-26 May 2000 at Naples-Capri, Italy.) Violante, A.; Huang, P. M.; Bollag, J. M.; and Gianfreda, L. (eds.); pp. 79-93; 2002.
*ISBN:* 0-444-51039-7
This citation is provided courtesy of CAB International/CABI Publishing.

1544. **Soil erosion and conservation in the United States: An overview.**
Magleby, Richard S. and United States. Dept. of Agriculture. Economic Research Service.
Washington, DC: U.S. Dept. of Agriculture, Economic Research Service; iii, 28, 1 p.: ill., maps; Series: Agriculture information bulletin no. 718. (1995)
*Notes:* "An Economic Research Service report." Cover title. "October 1995"--P. [i]. Includes bibliographical references (p. 27-[29]).
*NAL Call #:* 1--Ag84Ab-no.718
*Descriptors:* Soil erosion---United States/ Soil conservation---United States
This citation is from AGRICOLA.

1545. **Soil erosion and productivity: A brief review.**
Ponzi, D.
*Desertification Control Bulletin* (22): 36-44. (1993)
*NAL Call #:* GB611.D47;
*ISSN:* 0379-2455
*Descriptors:* erosion/ soil degradation/ land productivity/ relationships/ cost analysis/ losses
This citation is from AGRICOLA.

1546. **Soil erosion and soil problems.**
Higgitt, D.
*Progress in Physical Geography* 17 (4): 461-472. (1993);
*ISSN:* 0309-1333
This citation is provided courtesy of CAB International/CABI Publishing.

1547. **Soil erosion at multiple scales: Principles and methods for assessing causes and impacts.**
Penning de Vries, F. W. T.; Agus, F.; and Kerr, J.; xii, 390 p. (1998);
*ISBN:* 0-85199-290-0
This citation is provided courtesy of CAB International/CABI Publishing.

1548. **Soil erosion by water: Problems and prospects for research.**
Boardman, J.
In: Advances in hillslope processes/ Anderson, M. G. and Brooks, S. M.; Vol. 1.
Chichester, UK: John Wiley & Sons, 1996; pp. 489-505.
*ISBN:* 0-471-96774-2
This citation is provided courtesy of CAB International/CABI Publishing.

1549. **Soil erosion impact on agronomic productivity and environment quality.**
Lal, R.
*Critical Reviews in Plant Sciences* 17 (4): 319-464. (1998)
*NAL Call #:* QK1.C83;
*ISSN:* 0735-2689 [CRPSD3]
*Descriptors:* erosion/ crop production/ pollution/ water pollution/ air quality/ dust/ emission/ water reservoirs/ silt/ geological sedimentation/ soil fertility/ soil depth/ roots/ growth/ horizons/ runoff/ watersheds/ topsoil/ economic analysis/ soil water content/ surveys/ soil management/ sustainability/ soil formation/ desertification/ nitrogen fertilizers/ application rates/ crop yield/ soil organic matter/ clay fraction/ mathematical models/ literature reviews/ losses from soil
This citation is from AGRICOLA.

1550. **Soil Erosion Research for the 21st Century: Symposium.**
American Society of Agricultural Engineers
St. Joseph, Mich.: American Society of Agricultural Engineers, 2001.
*Notes:* Conference held 3-5 January 2001 at Honolulu, Hawaii; Co-sponsors: American Society of Agronomy (ASA), Chinese Soil and Water Conservation Society (CSWCS) Taiwan, Council of Agriculture (COA) Taiwan, European Society for Soil Conservation (ESSC), International Erosion Control Association (IECA), International Union of Soil Sciences (IUSS), Soil Science Society of America (SSSA), Soil and Water Conservation Society (SWCS), USDA-Agricultural Research Service (ARS), USDA-Cooperative State Research, Education, and Extension Service (CSREES), USDA-Forest Service (FS), USDA-Natural Resources Conservation Service (NRCS), and World Association of Soil and Water Conservation (WASWC)
http://horizon.nserl.purdue.edu/~flanagan/erosymp/statement.htm
*Descriptors:* soil erosion/ sedimentation/ agricultural research
*Abstract:* This consensus document was developed by participants of the symposium "Soil Erosion Research for the 21st Century," sponsored by the American Society of Agricultural Engineers (ASAE) and thirteen other professional societies and agencies. Participants comprised 210 soil erosion researchers and field practitioners from 30 countries, who gathered with the specific purpose of reviewing current scientific understanding of soil erosion and sedimentation and setting research directions and goals for the next two decades.

1551. **Soil fertility and fertilizers: An introduction to nutrient management.**
Havlin, John.
Upper Saddle River, N.J.: Prentice Hall; x, 499 p.: ill. (some col.), maps. (1999)
*Notes:* 6th ed.; Includes bibliographical references and index.
*NAL Call #:* S633-.S715-1999;
*ISBN:* 0136268064
*Descriptors:* Fertilizers/ Soil fertility/ Crops---Nutrition
This citation is from AGRICOLA.

1552. **Soil fertility management and insect pests: Harmonizing soil and plant health in agroecosystems.**
Altieri, Miguel A and Nicholls, Clara I
*Soil and Tillage Research* 72 (2): 203-211. (2003)
*NAL Call #:* S590.S48;
*ISSN:* 0167-1987
*Descriptors:* inorganic fertilizers: excessive use/ nitrogen: nutrient/ nutrient: plant tissue levels / insect (Insecta): herbivore, pest/ Animals/ Arthropods/ Insects/ Invertebrates/ active soil biology/ agroecosystems/ crop nutrition/ nutrient imbalances/ organic fertilizers/ organic matter/ soil biological properties/ soil chemical properties/ soil fertility/ soil fertility management/ soil physical properties/ soil plant health harmonization
*Abstract:* Cultural methods such as crop fertilization can affect susceptibility of plants to insect pests by altering plant tissue nutrient levels. Research shows that the ability of a crop plant to resist or tolerate insect pests and diseases is tied to optimal physical, chemical and mainly biological properties of soils. Soils with high organic matter and active soil biology generally exhibit good soil fertility. Crops grown in such soils generally exhibit lower abundance of several insect herbivores, reductions that may be attributed to a lower nitrogen content in organically farmed crops. On the other hand, farming practices, such as excessive use of inorganic fertilizers, can cause nutrient imbalances and lower pest resistance. More studies comparing pest populations on plants treated with synthetic versus organic fertilizers are needed. Understanding the underlying effects of why organic fertilization appears to improve plant health may lead us to new and better integrated pest management and integrated soil fertility management designs.


1553. **Soil health and sustainability.**
Doran, J. W.; Sarrantonio, M.; and Liebig, M. A.
*Advances in Agronomy 56: 1-54.* (1996)
*NAL Call #:* 30-Ad9;
*ISSN:* 0065-2113 [ADAGA7]
*Descriptors:* soil/ quality/ sustainability/ assessment/ soil resources/ resource management/ environmental protection/ farming systems/ literature reviews
This citation is from AGRICOLA.

1554. **Soil health and sustainability: Managing the biotic component of soil quality.**
Doran, John W and Zeiss, Michael R
*Applied Soil Ecology* 15 (1): 3-11. (2000)
*NAL Call #:* QH541.5.S6A67
*Descriptors:* anthropogenic impact/ biotic component management/ ecosystem management/ land use/ soil health/ soil quality/ sustainability/ sustainable management system
*Abstract:* Soil health is the capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and promote plant and animal health. Anthropogenic reductions in soil health, and of individual components of soil quality, are a pressing ecological concern. A conference entitled 'Soil Health: Managing the Biological Component of Soil Quality' was held was held in the USA in November 1998 to help increase awareness of the importance and

utility of soil organisms as indicators of soil quality and determinants of soil health. To evaluate sustainability of agricultural practices, assessment of soil health using various indicators of soil quality is needed. Soil organism and biotic parameters (e.g. abundance, diversity, food web structure, or community stability) meet most of the five criteria for useful indicators of soil quality. Soil organisms respond sensitively to land management practices and climate. They are well correlated with beneficial soil and ecosystem functions including water storage, decomposition and nutrient cycling, detoxification of toxicants, and suppression of noxious and pathogenic organisms. Soil organisms also illustrate the chain of cause and effect that links land management decisions to ultimate productivity and health of plants and animals. Indicators must be comprehensible and useful to land managers, who are the ultimate stewards of soil quality and soil health. Visible organisms such as earthworms, insects, and molds have historically met this criterion. Finally, indicators must be easy and inexpensive to measure, but the need for knowledge of taxonomy complicates the measurement of soil organisms. Several farmer-participatory programs for managing soil quality and health have incorporated abiotic and simple biotic indicators. The challenge for the future is to develop sustainable management systems which are the vanguard of soil health; soil quality indicators are merely a means towards this end.


1555. **Soil invertebrates as bioindicators of human disturbance.**
Paoletti, M. G. and Bressan, M.
*Critical Reviews in Plant Sciences* 15 (1): 21-26. (1996)
*NAL Call #:* QK1.C83;
*ISSN:* 0735-2689 [CRPSD3]
*Descriptors:* soil fauna/ soil invertebrates/ biological indicators/ checklists/ soil pollution/ ecosystems/ heavy metals/ sulfur/ pesticide residues/ herbicide residues/ dosage effects/ disturbed soils/ literature reviews
This citation is from AGRICOLA.

1556. **Soil microbial biomass: What do the numbers really mean.**
Dalal, R. C.
*Australian Journal of Experimental Agriculture* 38 (7): 649-665. (1998)
*NAL Call #:* 23-Au792;
*ISSN:* 0816-1089.
*Notes:* Special issue: Moving towards precision with soil and plant analysis. Proceedings of the Second National Conference and Workshops of the Australian Soil and Plant Analysis Council, November 23-26, 1997, Launceston, Tasmania. Includes references.
*Descriptors:* soil organic matter/ soil flora/ soil fauna/ carbon/ nitrogen/ phosphorus/ sulfur/ mineralization/ biological activity in soil/ techniques/ literature reviews/ nutrient sink/ soil quality/ soil health/ pesticide degradation
This citation is from AGRICOLA.

1557. **Soil organic matter and management of plant-parasitic nematodes.**
Widmer, T. L.; Mitkowski, N. A.; and Abawi, G. S.
*Journal of Nematology* 34 (4): 289-295. (Dec. 2002)
*NAL Call #:* QL391.N4J62;
*ISSN:* 0022-300X [JONEB5].
*Notes:* Symposium paper presented at the 39th Annual Meeting of the Society of Nematologists, June 24-28, 2000, Quebec City, Quebec, Canada. Includes references.
*Descriptors:* nematoda/ plant parasitic nematodes/ nematode control/ cultural control/ hosts of plant pests/ crops/ rotations/ cover crops/ green manures/ soil organic matter/ organic amendments/ soil management/ literature reviews
*Abstract:* Organic matter and its replenishment has become a major component of soil health management programs. Many of the soil's physical, chemical, and biological properties are a function of organic matter content and quality. Adding organic matter to soil influences diverse and important biological activities. The diversity and number of free-living and plant-parasitic nematodes are altered by rotational crops, cover crops, green manures, and other sources of organic matter. Soil management programs should include the use of the proper organic materials to improve soil chemical, physical, and biological parameters and to suppress plant-parasitic nematodes and soilborne pathogens. It is critical to monitor the effects of organic matter additions on activities of major and minor plant-parasitic nematodes in the production system. This paper presents a general review of information in the literature on the effects of crop rotation, cover crops, and green manures on nematodes and their damage to economic crops.
This citation is from AGRICOLA.

1558. **Soil organic matter and nitrogen management in dryland cropping systems.**
Payne, R. A.
Adelaide, SA: Primary Industries, South Australia; 2 v.: ill.; Series: Technical report (Dept. of Primary Industries) no. 211-212. (1993)
*Notes:* "August 1993." "AGDEX 536." Includes bibliographical references; Contents note: pt. 1. Soil organic matter sustainability -- pt. 2. Nitrogen requirements for dryland cereal crops.
*NAL Call #:* S478.A86T4--no.211-212; *ISBN:* 0730821439 (set); 0730821145 (pt.1); 0730821234 (pt.2)
This citation is from AGRICOLA.

1559. **Soil organic matter is essential to solving soil and environmental problems.**
Wallace, Arthur
*Communications in Soil Science and Plant Analysis* 25 (1-2): 15-28. (1994)
*NAL Call #:* S590.C63;
*ISSN:* 0010-3624
*Descriptors:* agriculture/ erosion/ mineralization/ physical properties/ resource management/ water holding capacity
*Abstract:* Fifty per cent, more or less, of the soil organic matter from farm lands has been lost. The remainder is perhaps more resistant to loss and therefore is stable but that which has been lost was perhaps the most important half--it resisted erosion, it made soils permeable, it increased water-holding capacity and it produced healthy crops. The 50 per cent that has been lost is via two major mechanisms. One is loss per unit weight of soil by decomposition (mineralization) induced by cultivation, and the other is loss by erosion--loss by wash away and blow away of the surface soil which contains the most soil organic matter. Both mineralization and erosion are downhill processes. If they are not in equilibrium with reverse processes, the land cannot be sustainable. If agriculture is to be sustainable, we have to look at soil organic matter,

first and foremost, as a means for maintaining stable-tillable soil. Mining of soil for nutrients and letting soil organic matter levels decrease can never result in sustainable agriculture. The role of soil organic matter as a source of nitrogen and other nutrients is less important than that of providing excellent physical and biological properties of soil. Use of water-soluble polymer soil conditioners can help.
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1560. **Soil phosphorus management and water quality: A UK perspective.**
Edwards, A C and Withers, P J A
*Soil Use and Management*
14 (supplement): 124-130. (1998)
*NAL Call #:* S590.S68;
*ISSN:* 0266-0032
*Descriptors:* phosphorus: availability, fertilizer, nutrient, pollution potential/ agriculture/ soil management/ water quality
*Abstract:* An increasing proportion of P reaching surface waters appears to be derived from agricultural land; apportioning the relative contribution to particular farming systems is not straightforward. The majority of farms in the UK operate on the basis of an annual agricultural P surplus, the size of which varies across different farm types. Particularly high values (>20 kg ha-1) are commonly associated with intensive-livestock production and the lower values (< 10 kg P ha-1) with arable farms. The geographical divide between the predominance of arable cropping in the east and livestock enterprises in the west of the UK should result in an uneven pattern to the distribution of annual P surplus. The expected cumulative effects of this surplus should be a noticeable increase in total and extractable soil P concentrations, but this is not readily apparent. While evidence from experimental plots suggests a relationship between the concentration of available soil P and that present in drainage waters, extrapolating this information so that it can be useful at the scale of a whole catchment is difficult. The loss of P from agricultural land is controlled by factors which are independent of the size of the annual P surplus. The pattern of P cycling, together with the dominant loss pathways, differ greatly between livestock and arable farming systems. Proportioning the contributions that either increased soil erosion arising from changing agricultural practices or the cumulative effect of a P surplus have had upon P loss is a necessary prerequisite to effective management.
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1561. **Soil phosphorus saturation degree: Review of some indices and their suitability for P management in Quebec, Canada.**
Beauchemin, S. and Simard, R. R.
*Canadian Journal of Soil Science*
79 (4): 615-625. (Nov. 1999)
*NAL Call #:* 56.8-C162;
*ISSN:* 0008-4271 [CJSSAR]
*Descriptors:* soil chemistry/ phosphorus/ base saturation/ indexes/ solubility/ relationships/ sorption isotherms/ water pollution/ pollution control/ management/ Quebec/ phosphorus sorption capacity/ nutrient management
This citation is from AGRICOLA.

1562. **Soil physics, pesticides, & pathogens.**
U.S. Department of Agriculture, George E. Brown Jr. Salinity Laboratory Soil Physics and Pesticide Research Unit
Riverside, CA: George E. Brown Jr. Salinity Laboratory, Soil Physics and Pesticide Research Unit. (2002)
*Notes:* Title from web page. Description based on content viewed April 30, 2002.
*NAL Call #:* aS595-.G46-2002
http://www.ussl.ars.usda.gov/physics.htm
*Descriptors:* George E Brown, Jr. Salinity Laboratory, Soil Physics and Pesticide Research Unit/ Soils, Salts in---Research---United States/ Groundwater---Quality---Research---United States/ Computer simulation/ Crops and water---Research---United States/ Pesticides---Environmental aspects---Research---United States
*Abstract:* The mission of the Soil Physics and Pesticide Research Unit is to develop methods for evaluating, predicting, and managing the movement of water, salts and agricultural chemicals in the root and vadose zones of salt-affected soils and to develop tools for assessing new soil-water-crop management schemes to make effective use of limited resources where salinity and/or pesticides are a concern.
This citation is from AGRICOLA.

1563. **Soil, plant and atmospheric conditions as they relate to ammonia volatilization.**
Sharpe, R. R. and Harper, L. A.
*Fertilizer Research* 42 (1/3): 149-153. (1995)
*NAL Call #:* S631.F422;
*ISSN:* 0167-1731 [FRESDF].
*Notes:* Special issue: Nitrogen economy in tropical soils / edited by N. Ahmad. Includes references.
*Descriptors:* ammonia/ volatilization/ nitrogen/ losses from soil/ nitrogen cycle/ transport processes/ determination/ atmosphere/ concentration/ measurement/ analytical methods/ evaluation/ accuracy/ micrometeorology/ environmental factors/ stable isotopes/ nitrogen fertilizers/ urea/ manures/ animal wastes/ crops/ adsorption/ efflux/ reviews/ nitrogen balance method/ enclosure method/ micrometeorological method
*Abstract:* Gaseous ammonia (NH3) transport is an important pathway in the terrestrial N cycle. In the atmosphere NH3 neutralizes airborne acids and is a major factor determining air quality and acid rain deposition patterns. Redeposition of atmospheric NH3 plays an important role in the N balance of natural ecosystems and has been implicated in forest decline, plant species change and eutrophication of surface water. Much of the N in soil-plant animal systems can be lost to the atmosphere, particularly with surface applied livestock waste, or urea and anhydrous ammonia fertilizers. Plants can have a significant impact on NH3 transport because they can both absorb and desorb atmospheric NH3. Under conditions of low soil N or high atmospheric NH3 concentrations, plants absorb NH3. Under conditions of high soil N or low atmospheric NH3 concentrations, plants volatilize NH3. This article discusses methods for evaluating NH3 transport in the filed, the rate of NH3 volatilized from fertilizer application, and the effects of plants on net NH3 transport.
This citation is from AGRICOLA.

1564. **Soil-plant nitrogen dynamics: What concepts are required.**
Stockdale, E. A.; Gaunt, J. L.; and Vos, J.
*European Journal of Agronomy*
7 (1/3): 145-159. (Sept. 1997)
*NAL Call #:* SB13.E97;
*ISSN:* 1161-0301.

*Notes:* Special issue: Perspectives for Agronomy--Adopting Ecological Principles and Managing Resource Use / edited by M.K. Van Ittersum and S.C. Van de Geijn. Proceedings of a conference held July 7-11, 1996, Veldhoven-Wageningen, The Netherlands. Includes references.
*Descriptors:* nitrogen cycle/ plants/ soil fertility/ simulation models/ agricultural research/ crop management/ nitrogen/ nutrition physiology/ efficiency/ fertilizers/ guidelines/ application rates/ losses/ literature reviews
This citation is from AGRICOLA.

1565. **The soil quality concept: A tool for evaluating sustainability.**
Karlen, D. L. and Andrews, S. S.
In: Soil stresses, quality and care: Proceedings from NJF seminar 310 [DIAS Report: Plant Production, No. 38]. Elmholt, Susanne (eds.)
Tjele, Denmark: Danish Institute of Agricultural Sciences, Research Centre Foulum; pp. 15-26; 2000.
*Notes:* Conference held: 10-12 April 2000
*NAL Call #:* SB187.D4 D54 nr. 38
This citation is provided courtesy of CAB International/CABI Publishing.

1566. **Soil quality field tools: Experiences of USDA-NRCS Soil Quality Institute.**
Ditzler, C. A. and Tugel, A. J.
*Agronomy Journal* 94 (1): 33-38. (2002)
*NAL Call #:* 4-AM34P;
*ISSN:* 0002-1962
This citation is provided courtesy of CAB International/CABI Publishing.

1567. **Soil resilience: A fundamental component of soil quality.**
Seybold, C. A.; Herrick, J. E.; and Brejda, J. J.
*Soil Science* 164 (4): 224-234. (Apr. 1999)
*NAL Call #:* 56.8-So3;
*ISSN:* 0038-075X [SOSCAK]
*Descriptors:* soil/ soil resources/ sustainability/ literature reviews/ terminology
This citation is from AGRICOLA.

1568. **Soil solution and other soil analyses as indicators of nutrient supply: A review.**
Smethurst, P. J.
*Forest Ecology and Management* 138 (1-3): 397-411. (2000)
*NAL Call #:* SD1.F73;
*ISSN:* 0378-1127.
*Notes:* Publisher: Elsevier Science
*Descriptors:* Reviews/ Soil nutrients/ Nutrient availability/ Soil chemistry/ Forest management/ Eucalyptus/ Management
*Abstract:* This review examines the potential for using soil solution as a tool for managing soil fertility. A review of the current use of other types of soil analyses indicates that, while their use in some cases is justified, there are substantial limitations to the development of reliable and widely applicable calibrations. Factors that govern concentrations of nutrients in soil solution and the methods for measuring them are reviewed in relation to their use in nutrient management of forest plantations and agricultural crops. Topics include a discussion of (i) nutrient supply and uptake mechanisms; (ii) solution culture studies which define critical concentrations in solution; (iii) methods of sampling solution from soils and (iv) estimation of concentrations that can be maintained at root surfaces in soil. By inference, nutrient supply would not limit plant growth if concentrations at most root surfaces (e.g. young roots in surface soil) were maintained at or above concentrations needed to maintain high rates of growth in solution culture, i.e. critical concentrations. Several aspects of this method have been validated for N and P in Eucalyptus nitens plantations. For example, when concentrations of ammonium (the preferred N source for E. nitens) in the field fell below the critical level of 50 mu M, plantations of E. nitens responded to applications of N-fertilizer. This method was also useful for predicting P deficiency in corn (Zea mays), Eucalyptus globulus and E. nitens grown in soils of widely different P-supply characteristics. The convergence of concepts based on the principles of soil nutrient supply and uptake, which link soil and solution culture studies, is likely to provide a unifying approach for diagnosing nutrient-supply limitations to plant growth and a practical tool for nutrient management in forest plantations.


1569. **Soil tillage: A review.**
Sturny, W. G.
*Revue Suisse d'Agriculture* 25 (3): 154-168. (1993);
*ISSN:* 0375-1325
This citation is provided courtesy of CAB International/CABI Publishing.

1570. **Soil translocation by tillage tools.**
Sharifat, K.; Kushwaha, R. L.; and Reed, W. B.
In: 1994 International Summer Meeting sponsored by the American Society of Agricultural Engineers. (Held 19 Jun 1994-22 Jun 1994 at Kansas City, Missouri.)
St. Joseph, Mich.: American Society of Agricultural Engineers; 17 p.; 1994.
*Notes:* Paper numbers: 94-1039/94-1074;
*ISSN:* 0149-9890
*NAL Call #:* 290.9-Am32P
*Descriptors:* tillage/ erosion/ soil movement/ soil water/ soil compaction/ simulation/ literature reviews
This citation is from AGRICOLA.

1571. **Soils, land use and sustainable agriculture: A review.**
Miller, F. P. and Wali, M. K.
*Canadian Journal of Soil Science* 75 (4): 413-422. (Nov. 1995)
*NAL Call #:* 56.8-C162;
*ISSN:* 0008-4271 [CJSSAR]
*Descriptors:* agricultural land/ land use/ sustainability/ soil/ quality/ land management/ food security/ soil quality/ sustainable development
This citation is from AGRICOLA.

1572. **Solid-liquid separation of animal manure for odor control and nutrient management.**
Zhang, R. H. and Westerman, P. W.
*Applied Engineering in Agriculture* 13 (5): 657-664. (Sept. 1997)
*NAL Call #:* S671.A66;
*ISSN:* 0883-8542
*Descriptors:* animal manures/ liquid manures/ solid wastes/ separation/ techniques/ odor abatement/ nutrients/ management/ waste utilization/ waste treatment/ separators/ design/ operation/ performance/ economic analysis/ literature reviews/ manure management systems
*Abstract:* Solid-liquid separation can be an effective manure treatment method for producing nutrient-rich organic solids for multiple uses and potentially reducing the odor generation rate and nutrient contents

in liquid manure storage and treatment units. This article discusses the characteristics of animal manure relevant to solid-liquid separation for odor control and nutrient management, reviews the basic concepts used in different separation processes, and presents the design and operational principles and performance data of several major types of separation equipment as compiled from an extensive literature review. Such information is very useful for agricultural and sanitary engineers and animal producers to select solid-liquid separation equipment for animal enterprises. The needs for further research and development in the area of solid-liquid separation are identified.
This citation is from AGRICOLA.

1573. **Solid-phase extraction of quaternary ammonium herbicides.**
Pico, Y; Font, G; Molto, J C; and Manes, J
*Journal of Chromatography A* 885 (1-2): 251-271. (2000)
*NAL Call #:* QD272.C4J68;
*ISSN:* 0021-9673
*Descriptors:* quaternary ammonium herbicides/ plant materials/ soil/ water
*Abstract:* This paper highlights recent advances in the solid-phase extraction (SPE) of quaternary ammonium herbicides in water, soil, plant and biological samples. After a brief introduction summarizing the properties of quaternary ammonium herbicides and the difficulties involved in measuring them, attention is paid primarily to solid supports used for isolation and concentration, pre-treatments required for the different matrices, and eluents applied for quantitative desorption of these analytes. The determination techniques used after SPE and applications of the proposed SPE methodology are also briefly discussed.
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1574. **Solid-phase sample preparation and stability of pesticides in water using Empore disks.**
Barcelo, D; Chiron, S; Lacorte, S; Martinez, E; Salau, J S; and Hennion, M C
*Trends in Analytical Chemistry* 13 (9): 352-361. (1994)
*NAL Call #:* QD71.T7;
*ISSN:* 0165-9936
*Descriptors:* analytical method/ gas chromatography/ mass spectrometry
© Thomson

1575. **Solving Algae Problems: French Expertise and World-Wide Applications.**
Mouchet, P. and Bonnelye, V.
*Aqua: Journal of Water Services Research and Technology* 47 (3): 125-141. (1998)
*NAL Call #:* TD201.A72;
*ISSN:* 0003-7214
*Descriptors:* France/ Reviews/ Algae/ Eutrophication/ Activated Carbon/ Technology/ Optimization/ Algal blooms/ Plant control/ Water treatment/ Toxicology/ Ozonation/ Filtration/ Sedimentation/ Algae/ Sources and fate of pollution/ Species interactions: pests and control/ Fungi
*Abstract:* This paper reviews the various methods available for removing planktonic microalgae (microstraining, direct filtration, sedimentation, flotation, polishing using ozonation and granular activated carbon [O sub(3) + GAC], membrane filtration), and discusses their comparative effectiveness, optimisation and limitations. Also described are the treatments considered most effective in the removal of odorous and/or toxic metabolites. In each case French technology and its world-wide applications are compared to those documented in the literature. The article concludes with recommendations on the most appropriate processes for treating eutrophic waters.
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1576. **Some agrometeorological aspects of pest and disease management for the 21st century.**
Strand, J. F.
*Agricultural and Forest Meteorology* 103 (1/2): 73-82. (June 2000)
*NAL Call #:* 340.8-AG8;
*ISSN:* 0168-1923.
*Notes:* Special issue: Agrometeorology in the 21st century: Needs and perspectives / edited by M.V.K. Sivakumar, C.J. Stigter, and D. Rijks. Paper presented at an international workshop held February 15-17, 1999, Accra, Ghana. Includes references.
*Descriptors:* agriculture/ plant pests/ plant diseases/ pest control/ disease control/ agricultural meteorology/ simulation models/ cropping systems/ pest management/ weeds/ crop weed competition/ transgenic plants/ genetic resistance/ biological control agents/ cultural control/ information needs/ agricultural chemicals/ weather data/ weather forecasting/ climatic factors/ climatic change/ risk assessment/ literature reviews
This citation is from AGRICOLA.

1577. **Some contributions to integrated crop management in Europe.**
Hewson, R. T. and Sagenmueller, A.
*Pest Management Science* 56 (11): 954-956. (Nov. 2000)
*NAL Call #:* SB951-.P47;
*ISSN:* 1526-498X
*Descriptors:* Integrated control/ Agricultural practices/ Europe/ Insecta/ Agricultural & general applied entomology
*Abstract:* This paper reports the successful outcome of case studies using integrated crop management (ICM) with a view to attaining sustainable, safe and economic practices for European farmers and growers. Examples are the adoption of 6-m conservation headlands to allow the use of selective herbicides for the control of problem weeds, whilst leaving non-competitive species as a habitat and food source for diverse fauna; a computerised warning system for the control of Phytophthora infestans in the Netherlands, enabling fewer fungicide applications; a computer model (Colibri) which allows French farmers and advisers to forecast development of Sitobion avenae populations in order to predict optimal dates for treatment and recommendations for achieving control of Myzus persicae in peaches grown in Italy which results in least harm to beneficial insects. Lower inputs have often resulted in more cost-effective programmes accompanied by less environmental impact, while support for farmers and growers by well-trained staff has proved to be an important factor contributing to successful outcome of the various projects.
© Cambridge Scientific Abstracts (CSA)

1578. **Sorption and binding of organic compounds in soils and their relation to bioavailability.**
Novak, J. M.; Jayachandran, K.; Moorman, T. B.; and Weber, J. B.
In: Bioremediation science and applications/ Skipper, H. D. and

Turco, R. F.; Series: SSSA special publication 43.
Madison, Wis.: Soil Science Society of America, 1995; pp. 13-31
*NAL Call #:* S590.S62-no.43
*Descriptors:* polluted soils/ pesticide residues/ contamination/ pesticides/ adsorption/ desorption/ binding/ binding sites/ bioavailability/ microbial flora/ microbial degradation/ bioremediation/ transformation/ detoxification/ soil pollution/ pollution control/ literature reviews
This citation is from AGRICOLA.

1579. **Sources and Impacts of Irrigation Drainwater Contaminants in Arid Wetlands.**
Lemly, A. D.; Finger, S. E.; and Nelson, M. K.
*Environmental Toxicology and Chemistry* 12 (12): 2265-2279. (1993)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268
*Descriptors:* wetlands / arid environments/ contaminants/ agriculture / irrigation/ drainage/ reviews/ agricultural wastes/ agricultural runoff/ water supply/ ecological effects/ environmental effects/ toxicity/ pollutants/ regulations/ Western/ Wetlands/ Environmental impact/ Sources and fate of pollution/ Freshwater pollution/ United States
*Abstract:* Arid wetlands are being contaminated by subsurface agricultural irrigation drainage throughout the western United States. Historic freshwater inflows have been diverted for agricultural and municipal use, and remaining freshwater supplies are not sufficient to maintain the integrity of these important natural areas once they are degraded by irrigation drainwater. Waterfowl populations are threatened in the Pacific and Central Flyways; migratory birds have been poisoned by drainwater contaminants on at least six national wildlife refuges. Subsurface irrigation drainage is the most widespread and biologically important source of contaminants to wetlands in arid regions of the country. The case history of poisoning at Kesterson National Wildlife Refuge in California and studies at other locations by the U.S. Department of the Interior provide detailed information on the toxicity of drainwater contaminants to fish and wildlife. Biogeochemical conditions favorable for the production of toxic drainage are found throughout the western states. Two actions seem necessary to prevent further drainage-related degradation of arid wetlands. First is a reduction in the amount of contaminants reaching these wetlands, possibly involving regulatory intervention through the National Pollutant Discharge Elimination System permit process. Second, a better balance must be achieved in the way fresh water is allocated between agriculture and wildlife. Federally subsidized water has supported agriculture at the expense of wetlands for nearly 100 years in the western United States. This trend must be reversed if arid wetlands and their fish and wildlife populations are to survive.


1580. **Sources of Methyl Mercury to Freshwater Ecosystems: A Review.**
Rudd, J. W. M.
*Water, Air and Soil Pollution* 80 (1-4): 697-713. (1995)
*NAL Call #:* TD172.W36;
*ISSN:* 0049-6979.
*Notes:* Conference: Third International Conference on Mercury as a Global Pollutant, Whistler, BC (Canada), 10-14 Jul 1994; Editors: Porcella, D. // Huckabee, J. // Wheatley, B.
*Descriptors:* methyl mercury/ freshwater environments/ lakes/ wetlands/ pollutant deposition/ aquatic environment/ literature reviews/ inland water environment/ pollution dispersion/ air pollution/ water pollution/ methylmercury/ water pollution sources/ ecosystems/ analytical methods/ literature review/ Freshwater pollution/ Behavior and fate characteristics/ Sources and fate of pollution
*Abstract:* The recent development of sensitive analytical techniques for the determination of MeHg concentrations in water has resulted in a rapid advancement in our understanding of MeHg production and transport in lake and reservoir systems. Results from three recent whole-ecosystem studies have shown that there are three important sources of MeHg to aquatic systems - precipitation, runoff from wetlands, and inlake methylation. Data from these three studies are used to construct a simple model that illustrates how the relative importance of these sources can vary with rates of atmospheric deposition of MeHg, lake type, percentage of wetlands in the terrestrial catchment and the percentage of water surface area that covers flooded terrain.


1581. **Sources of Nutrient Pollution to Coastal Waters in the United States: Implications for Achieving Coastal Water Quality Goals.**
Howarth, R. W.; Sharpley, A.; and Walker, D.
*Estuaries* 25 (4b): 656-676. (2002)
*NAL Call #:* GC96.E79;
*ISSN:* 0160-8347.
*Notes:* Special issue: Nutrient Over-enrichment in Coastal Waters: Global Patterns of Cause and Effect
*Descriptors:* Nutrients (mineral)/ Nitrogen/ Phosphorus/ River basins/ River discharge/ Brackishwater pollution/ Eutrophication/ Anoxic conditions/ Oxygen depletion/ Coastal waters/ Pollution effects/ Wastewater treatment/ Sewage/ Agricultural runoff/ Pollution control/ Pollution sources/ Water pollution/ Inland water environment/ Reviews/ United States/ Estuaries / Water Pollution Sources/ Nutrients/ Wastewater Disposal/ Nonpoint Pollution Sources/ Air Pollution/ Spatial Distribution/ Temporal Distribution/ Water Pollution Control/ Pollution (Water)/ Pollution (Nonpoint sources)/ Runoff (Agricultural)/ Pollution (Air)/ Distribution (Mathematical)/ Time dependent/ Nutrient concentrations/ Sewage treatment plants/ Marine pollution/ United States/ United States, Mississippi River/ ASW, USA, Gulf Coast/ Pollution Environment/ Behavior and fate characteristics/ Pollution studies general/ Sources and fate of pollution/ Water Quality/ Marine Pollution/ Water Pollution: Monitoring, Control & Remediation
*Abstract:* Some 60% of coastal rivers and bays in the U.S. have been moderately to severely degraded by nutrient pollution. Both nitrogen (N) and phosphorus (P) contribute to the problem, although for most coastal systems N additions cause more damage. Globally, human activity has increased the flux of N and P from land to the oceans by 2-fold and 3-fold, respectively. For N, much of this increase has occurred over the past 40 years, with the increase varying by region. Human activity has increased the flux of N in the Mississippi River basin by 4-fold, in the rivers of the north-eastern U.S. by 8-fold, and in the rivers draining to the North Sea by more than 10-fold. The sources of

nutrients to the coast vary. For some estuaries, sewage treatment plants are the largest single input; for most systems nonpoint sources of nutrients are now of relatively greater importance, both because of improved point source treatment and control (particularly for P) and because of increases in the total magnitude of nonpoint sources (particularly for N) over the past three decades. For P, agricultural activities dominate nonpoint source fluxes. Agriculture is also the major source of N in many systems, including the flux of N down the Mississippi River, which has contributed to the large hypoxic zone in the Gulf of Mexico. For both P and N, agriculture contributes to nonpoint source pollution both through losses at the field scale, as soils erode away and fertilizer is leached to surface and ground waters, and from losses from animal feedlot operations. In the U.S. N from animal wastes that leaks directly to surface waters or is volatilized to the atmosphere as ammonia may be the single largest source of N that moves from agricultural operations into coastal waters. In some regions, including the northeastern U.S., atmospheric deposition of oxidized N from fossil-fuel combustion is the major flux from nonpoint sources. This atmospheric component of the N flux into estuaries has often been under-estimated, particularly with respect to deposition onto the terrestrial landscape with subsequent export downstream. Because the relative importance of these nutrient sources varies among regions and sites, so too must appropriate and effective mitigation strategies. The regional nature and variability of nutrient sources require that nutrient management efforts address large geographic areas.


1582. **Sources of nutrients in the nation's watersheds.**
Smith, Richard A. and
Alexander, Richard B.
Reston, Va.: U.S. Geological Survey. (2000)
*NAL Call #:* TD428.8 .S65 2000
http://water.usgs.gov/nawqa/sparrow/nut%5Fsources/nut%5Fsources.htm
*Descriptors:* Nonpoint source pollution---United States/ Fertilizers---Environmental aspects---United States/ Water---Pollution---United States/ Agricultural pollution---Environmental aspects---United States/ Eutrophication---United States/ Watershed management---United States
*Abstract:* SPARROW and Nutrient Sources; Also available at: http://water.usgs.gov/nawqa/sparrow/nut%5Fsources/Nutrients%5FSPARROW%5Fpaper.pdf
This citation is from AGRICOLA.

1583. **Southern forested wetlands: Ecology and management.**
Messina, M. G. and
Conner, William H.
Boca Raton, Fla.: Lewis Publishers; 616 p.: ill., maps. (1998)
*Notes:* Includes bibliographical references (p. 493-582) and index.
*NAL Call #:* SD410.9.S68--1998;
*ISBN:* 1566702283 (alk. paper)
*Descriptors:* Wetland forestry/ Forested wetlands---Management/ Wetlands---Management/ Wetland ecology/ Forest ecology
This citation is from AGRICOLA.

1584. **Spatial patterns and fragmentation: Indicators for conserving biodiversity in forest landscapes.**
Loyn, R. H. and McAlpine, C.
In: Criteria and indicators for sustainable forest management: Papers presented at a IUFRO/CIFOR/FAO conference, Sustainable forest management: Fostering stakeholder input to advance development of scientifically based indicators. (Held Aug 1998 at Melbourne, Australia.) Raison, R. J.; Brown, A. G.; and Flinn, D. W. (eds.) Wallingford, UK: CAB International; pp. 391-422; 2001.
*ISBN:* 0-85199-392-3
This citation is provided courtesy of CAB International/CABI Publishing.

1585. **Spatial Variability of Microbial Processes in Soil: A Review.**
Parkin, T. B.
*Journal of Environmental Quality* 22 (3): 409-417. (1993)
*NAL Call #:* QH540.J6 [JEVQAA]
*Descriptors:* Agricultural chemicals/ Fate of pollutants/ Path of pollutants/ Soil bacteria/ Soil environment/ Water pollution control/ Cropland/ Farm management/ Fertilizers/ Leaching/ Pesticides/ Spatial variation/ Statistical analysis/ Sources and fate of pollution/ Water quality control/ Water in soils
*Abstract:* Microbial transformations of fertilizers and pesticides in the surface soil have a direct impact on the mass of the agrochemical that is susceptible to leaching losses. The greatest potential for controlling leaching losses of agrochemicals is through the management of these compounds in the surface soil. A variety of strategies have been employed to maximize the residence time of applied chemical in the surface soil, including: timing of application, formulation (e.g., slow-release fertilizers and encapsulated pesticides), and the use of compounds that modify microbial activity in soil (e.g., nitrification inhibitors). Although these strategies have met with some success, more precise quantification of the microbial transformations of agrochemicals is required to aid the development of improved management strategies. The high spatial variability exhibited by many microbial processes, in many cases, precludes precise quantification. A greater understanding of the factors contributing to the variability of microbial processes allows for improved estimation, as well as for the assessment of key driving variables controlling microbial processes in soil. The discussion focuses on the scale at which variability is expressed (microscale, plot scale, landscape scale, and regional scale), and the soil and environmental variables that serve to control variability at each scale. The study of variability provides a mathematical or statistical framework that is useful in elucidating both the interactions involved in controlling soil processes as well as estimating the magnitude of a given microbial process in soils. (Author's abstract) 35 097797000


1586. **Species guides for wetland plantings in the southeast United States.**
Everett, H. Wayne and South National Technical Center (U.S.).
Fort Worth, TX: USDA, Soil Conservation Service, South National Technical Center; 1 v. (various pagings): maps. (1994)
*Notes:* 1st ed.; Cover title. "April 1994." Includes bibliographical references.

*NAL Call #:* aQK125.S64--1994
*Descriptors:* Wetland plants Southern states/ Wetland planting---Southern States
This citation is from AGRICOLA.

1587. **Spiders in decomposition food webs of agroecosystems: Theory and evidence.**
Wise, D. H.; Snyder, W. E.; Tuntibunpakul, P.; and Halaj, J.
*Journal of Arachnology* 27 (1): 363-370. (1999)
*NAL Call #:* QL451.J6;
*ISSN:* 0161-8202
This citation is provided courtesy of CAB International/CABI Publishing.

1588. **Spiking hydrophobic organic compounds into soil and sediment: A review and critique of adopted procedures. [Erratum: Feb 2001, v. 20 (2), p. 458.].**
Northcott, G. L. and Jones, K. C.
*Environmental Toxicology and Chemistry* 19 (10): 2418-2430. (Oct. 2000)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268 [ETOCDK]
*Descriptors:* organic compounds/ soil/ sediment/ analytical methods/ soil spiking procedures
*Abstract:* Studies on the fate and effects of organic pollutants in soil and sediment are often carried out under laboratory conditions and often require the study compound to be introduced, or spiked, into the test substrate. The procedures adopted to spike relatively large amounts of hydrophobic organic compounds into soil and sediment can introduce interferences into experiments that have the potential to dominate the process(es) under investigation. This review identifies and discusses key factors of spiking procedures that can introduce significant interferences to experiments. These include soil or sediment drying and rewetting, effects of carrier solvents, and the homogeneity of spike distribution. The persistence of solvents, and therefore their contribution to soil and sediment organic carbon, is discussed with reference to potential effects on the partitioning behavior of spiked compounds. We have summarized the spiking procedures used in 64 published articles and have evaluated the information supplied by authors. From this analysis, we conclude that, in general, authors should report more detailed information regarding the procedural aspects of compound spiking. We conclude that standard operating procedures need to be validated and recommended for spiking organic compounds into soil and sediment by recommended organizations. As an aid to this process, we recommend a number of practices to observe when spiking organic compounds into soil and sediment.
This citation is from AGRICOLA.

1589. **Status and trends of wetlands in the conterminous United States 1986 to 1997.**
Dahl, Thomas E. and U.S. Fish and Wildlife Service.
Washington, D.C.: U.S. Dept. of the Interior, Fish and Wildlife Service; 82 p.: ill. (some col.), col. maps. (2000)
*Notes:* "December 2000"--P. 4 of cover. Includes bibliographical references (p. 70-72).
*NAL Call #:* QH541.5.M3-D33-2000
*Descriptors:* Wetlands---United States/ Wetland conservation---United States
This citation is from AGRICOLA.

1590. **The status of IPM... Past, present and future.**
Polk, D.
*Pennsylvania Fruit News* 79 (4): 19-23. (1999);
*ISSN:* 0031-451X
This citation is provided courtesy of CAB International/CABI Publishing.

1591. **Stomatal control by chemical signalling and the exploitation of this mechanism to increase water use efficiency in agriculture.**
Davies, W. J.; Wilkinson, S.; and Loveys, B.
*New Phytologist* 153 (3): 449-460. (Mar. 2002)
*NAL Call #:* 450-N42;
*ISSN:* 0028-646X [NEPHAV].
*Notes:* Special issue: Stomata / edited by P. Ayres. Includes references.
*Descriptors:* plants/ water use efficiency/ stomatal movement/ plant breeding/ biochemical pathways/ shoots/ abscisic acid/ xylem/ pH/ sap/ translocation/ temperature/ irrigation/ plant water relations/ literature reviews
This citation is from AGRICOLA.

1592. **Storing carbon in agricultural soils to help mitigate global warming.**
Rosenberg, Norman J.
Ames, Iowa: Council for Agricultural Science and Technology, 2000. 8 p.
http://www.cast-science.org/cast-science.lh/pdf/glo2_ip.pdf
*Descriptors:* soil conservation/ global warming/ pollution control/ carbon sequestration/ agriculture
This citation is from AGRICOLA.

1593. **Strategies for chromatographic analysis of pesticide residues in water.**
Balinova, Anna
*Journal of Chromatography A* 754 (1-2): 125-135. (1996)
*NAL Call #:* QD272.C4J68;
*ISSN:* 0021-9673
*Descriptors:* analytical method/ coupled column liquid chromatography/ gas chromatography/ high performance liquid chromatography/ high performance thin layer chromatography/ HPLC/ liquid-liquid extraction/ methodology/ pesticide residues/ pesticides/ pollution/ purification method/ sample preparation method/ solid phase extraction/ solid phase microextraction/ supercritical fluid extraction/ water
*Abstract:* A review is presented of the modern techniques and approaches in methods for pesticide residue analysis in water matrices. The state of the art of the individual steps (extraction, clean-up, separation, identification, quantitation) of the chromatographic methods is reviewed with emphasis laid on emerging techniques which have gained popularity. The new approaches are discussed with respect to their relevancy to the requirements for increasing the sensitivity of detection and reliability of identification and quantitation at low levels of concentrations, arising from the European Community Drinking Water Directive.


1594. **Strategies to reduce environmental pollution from animal manure: Nutritional management option: Review.**
Paik, I K
*Asian Australasian Journal of Animal Sciences* 12 (4): 657-666. (1999)
*NAL Call #:* SF55.A78A7;
*ISSN:* 1011-2367
*Descriptors:* animal (Animalia)/ Animals/ manure environmental pollution/ nutritional management
*Abstract:* The first option in manure management is developing an environmentally sound nutritional

management. This includes proper feeding programs and feeds which will result in less excreted nutrients that need to be managed. Critical components that should be controlled are N, P and minerals that are used at supranutritional levels. Amino acid supplementation and protein restriction reduce N excretion in the monogastric animals. Supplementation with enzymes, such as carbohydrases, phytase and proteases, can be used to reduce excretion of nutrients and feces by improving digestibility of specific nutrients. Growth promoting agents, such as antibiotics, beta-agonists and somatotropin, increase the ability of animals to utilize nutrients, especially dietary protein, which results in reduced excretion of N. Some microminerals, such as Cu and Zn, are supplemented at supranutritional level. Metal-amino acid chelates, metal-proteinates and metal-polysaccharide complexes can be used at a much lower level than inorganic forms of metals without compromising performance of animals. Deodorases can be used to avoid air pollution from animal manure. Nutritional management increases costs to implement. It is necessary to assess the economics in order to find an acceptable compromise between the increased costs and the benefits to the environment and production as well.


1595. **Strategies to reduce environmental pollution from animal manure: Principles and nutritional management: A review.**
Paik IK; Blair R; and Jacob J
*Asian Australasian Journal of Animal Sciences* 9 (6): 615-635; 94 ref. (1996)
*NAL Call #:* SF55.A78A7
This citation is provided courtesy of CAB International/CABI Publishing.

1596. **Straw chopper systems for manure pipelines: Final report.**
Boyden, Alan.; Prairie Agricultural Machinery Institute (Canada); and Saskatchewan, Agriculture Development Fund
Regina, Saskatchewan, Canada: Agriculture Development Fund; various pagings: ill. (2000)
*Notes:* "ADF #9700326." "March 2000." "Prepared by: PAMI"--Cover. Includes bibliographical references (p. 1, 4th group).; Contents note: Efficient injection for sustainable nutrient management of manure / Alan Boyden ... [et al.] -- Development of a hog manure pipeline control system / Alan Boyden ... [et al.].
*NAL Call #:* TD930.2-.S77-2000
*Descriptors:* Manure handling--- Equipment and supplies
This citation is from AGRICOLA.

1597. **Stream and riparian management for freshwater turtles.**
Bodie, J.
*Journal of environmental management* 62 (4): 443-455. (2001)
*NAL Call #:* HC75.E5J6;
*ISSN:* 0301-4797.
*Notes:* Publisher: Academic Press
*Descriptors:* Riparian environments/ Environment management/ Streams/ Conservation/ Nests/ Migration/ Freshwater organisms/ Wildlife/ Habitat/ Nature conservation/ Migrations/ Aquatic reptiles/ Ecosystem management/ Feeding/ Nesting/ Overwintering/ River basin management/ Water Resources Management/ Ecological Effects/ Literature Review/ Ecosystems/ Riparian Land/ Turtles/ Habitats/ Research Priorities/ Environmental Policy/ Testudines/ Reptilia/ United States/ Turtles/ Reptiles/ Tortoises / Terrapins/ Reptiles/ Environmental action/ Conservation, wildlife management and recreation/ Ecological impact of water development
*Abstract:* The regulation and management of stream ecosystems worldwide have led to irreversible loss of wildlife species. Due to recent scrutiny of water policy and dam feasibility, there is an urgent need for fundamental research on the biotic integrity of streams and riparian zones. Although riverine turtles rely on stream and riparian zones to complete their life cycle, are vital producers and consumers, and are declining worldwide, they have received relatively little attention. I review the literature on the impacts of contemporary stream management on freshwater turtles. Specifically, I summarize and discuss 10 distinct practices that produce five potential biological repercussions. I then focus on the often-overlooked use of riparian zones by freshwater turtles, calculate a biologically determined riparian width, and offer recommendations for ecosystem management. Migration data were summarized on 10 species from eight US states and four countries. A riparian zone encompassing the majority of freshwater turtle migrations would need to span 150 m from the stream edge. Freshwater turtles primarily chose high, open, sandy habitats to nest. Nests in North America contained eggs and hatchlings during April through September and often through the winter. In addition, freshwater turtles utilized diverse riparian habitats for feeding, nesting, and overwintering. Additional documentation of stream and riparian habitat use by turtles is needed. Copyright 2001 Academic Press


1598. **Stream corridor restoration: Principles, processes, and practices.**
Federal Interagency Stream Restoration Working Group.
USDA, Natural Resources Conservation Service, 1998.
*Notes:* Cooperative effort among fifteen Federal agencies and partners to produce a common reference on stream corridor restoration./ Cover title./ Shipping list no.: 99-0011-S./ "National engineering handbook (NEH), part 653"--Transmittal sheet./ "October 1998."/ "August 26, 1998"--Transmittal sheet./ Includes bibliographical references and index.
http://www.usda.gov/stream_restoration/newgra.html

1599. **Stream Restoration: A Natural Channel Design Handbook.**
Doll, B. A.; Grabow, G. L.; Hall, K. R.; Halley, J.; Harman, W. A.; Jennings, G. D.; Wise, D. E.; North Carolina Stream Restoration Institute; and North Carolina Sea Grant.
North Carolina State University, 2003 (application/pdf)
http://www.bae.ncsu.edu/programs/extension/wqg/sri/stream_rest_guidebook/sr_guidebook.pdf
*Descriptors:* riverbank protection/ land management/ stream channels/ ecological restoration/ stream restoration/ natural channel design

1600. **A stream visual assessment protocol (SVAP) for riparian landowners.**
Bjorkland, R.; Pringle, C. M.; and Newton, B.
*Environmental Monitoring and Assessment* 68 (2): 99-125. (May 2001)

*NAL Call #:* TD194.E5;
*ISSN:* 0167-6369
*Descriptors:* Streams/ Riparian environments/ Environmental surveys/ Environmental monitoring/ United States/ Land/ Streams (in natural channels)/ River management/ Natural resources/ Water resources/ Conservation/ Agriculture/ Nature conservation/ Monitoring methods/ Water pollution measurements/ Riparian Land/ Land Tenure/ Monitoring/ Methodology/ Visual inspection/ Rivers/ Environment management/ United States/ landowners/ stream visual assessment protocol/ Methodology general/ Water Resources and Supplies/ Freshwater pollution/ Streamflow and runoff/ Protective measures and control/ Water Pollution: Monitoring, Control & Remediation
*Abstract:* A user-friendly Stream Visual Assessment Protocol (SVAP) was recently developed in a joint effort by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture and the University of Georgia. SVAP was designed to be an introductory screening-level assessment method for people unfamiliar with stream assessments. It was designed for use by NRCS field staff who work with agricultural landowners. NRCS is in a key position to influence conservation practices since the organization works with private stakeholders, maintaining more than 2000 field offices throughout the U.S. with a central office in each state. The SVAP measures a maximum of 15 elements and is based on visual inspection of the physical and biological characteristics of instream and riparian environments. Each element is assigned a numerical score relative to reference conditions and an overall score for the stream reach is calculated. A qualitative description of the stream reach is made based on overall numerical score. While SVAP is not intended to replace more robust stream assessment protocols, it provides quick and reliable information for use in NRCS farm assistance programs. It is also an educational tool through which landowners can learn about conservation of aquatic resources. An abridged copy of SVAP is attached as an appendix to this article and the complete document can be found on the web at www.ncg.nrcs.usda.gov/tech_notes.html.


1601. **Strengths and limitations of immunoassays for effective and efficient use for pesticide analysis in water samples: A review.**
Hennion, Marie Claire and Barcelo, Damia
*Analytica Chimica Acta* 362 (1): 3-34. (1998)
*NAL Call #:* 381 An1;
*ISSN:* 0003-2670
*Descriptors:* pesticide: analysis/ quality assurance/ water samples
*Abstract:* Immunoassay techniques provide a simple, powerful and inexpensive method for pesticide analysis. However, the acceptance of immunoassays is dependent on the demonstration of quality and validity compared to more traditional techniques. In this review, primarily, the knowledge and the fundamentals of immunoassay methods are given in order to make good use of immunoassays, especially of ELISA tests. Special attention is given to a better understanding of the high selectivity and sensitivity which is attained for some immunoassays and not for others. It is also explained why some immunoassays are a quantitative method whereas others can only be used as a screening method. The cross-reactivity process, the effect of the sample matrix and the data interpretation are illustrated by numerous examples from the literature. Other formats, especially flow-injection immunoassays, dipstick immunoassay and liposome-amplified immunoassays are presented. Quality assurance and guidelines for validation and use are given.


1602. **Strip tillage for "no-till" row crop production.**
Morrison, J. E. Jr.
*Applied Engineering in Agriculture* 18 (3): 277-284. (2002)
*NAL Call #:* S671.A66;
*ISSN:* 0883-8542


1603. **The strobilurin fungicides.**
Bartlett, Dave W; Clough, John M; Godwin, Jeremy R; Hall, Alison A; Hamer, Mick; and Parr Dobrzanski, Bob
*Pest Management Science* 58 (7): 649-662. (2002)
*NAL Call #:* SB951-.P47;
*ISSN:* 1526-498X
*Descriptors:* azoxystrobin: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ famoxadone: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ fenamidone: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ kresoxim methyl: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ metominostrobin: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ picoxystrobin: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ pyraclostrobin: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis/ trifloxystrobin: environmental safety, fungicide, mode of action, risk, strobilurin, synthesis
*Abstract:* Strobilurins are one of the most important classes of agricultural fungicide. Their invention was inspired by a group of fungicidally active natural products. The outstanding benefits they deliver are currently being utilised in a wide range of crops throughout the world. First launched in 1996, the strobilurins now include the world's biggest selling fungicide, azoxystrobin. By 2002 there will be six strobilurin active ingredients commercially available for agricultural use. This review describes in detail the properties of these active ingredients - their synthesis, biochemical mode of action, biokinetics, fungicidal activity, yield and quality benefits, resistance risk and human and environmental safety. It also describes the clear technical differences that exist between these active ingredients, particularly in the areas of fungicidal activity and biokinetics.

1604. **Stubble height as a tool for management of riparian areas.**
Clary, W. P. and Leininger, W. C.
*Journal of Range Management* 53 (6): 562-573. (2000)
*NAL Call #:* 60.18 J82;
*ISSN:* 0022-409X
This citation is provided courtesy of CAB International/CABI Publishing.

1605. **Study design for monitoring wetlands.**
Parker, Amanda K.; United States. Environmental Protection Agency. Health and Ecological Criteria Division; United States. Environmental Protection Agency. Wetlands Division; and United States. Environmental Protection Agency. Office of Water.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2002.
*Notes:* Original title: Study design for monitoring wetlands (#4).
Title from web page. "March 2002." "Prepared jointly by The U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetlands Division (Office of Wetlands, Oceans, and Watersheds)." "EPA 822-R-02-015." Description based on content viewed March 31, 2003. Includes bibliographical references.
*NAL Call #:* QH90.57.B5-P37-2002
http://www.epa.gov/waterscience/criteria/wetlands/4StudyDesign.pdf
*Descriptors:* Wetland management---United States/ Water quality management---United States/ Pollution---United States---Measurement/ Environmental sampling---United States
This citation is from AGRICOLA.

1606. **Subirrigation and controlled drainage.**
Belcher, H. W. and D'Itri, Frank M.
Boca Raton, Fla.: Lewis Publishers; xii, 482 p.: ill. (1995)
*NAL Call #:* S619.S92S83--1995;
*ISBN:* 1566701392 (acid-free paper)
*Descriptors:* Subirrigation---Congresses/ Drainage---Congresses
This citation is from AGRICOLA.

1607. **Substratum-Associated Microbiota.**
Tuchman, N. C. and Peterson, C. G.
*Water Environment Research* 67 (4): 702-713. (1995)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303
*Descriptors:* literature review/ substrates/ microbiological studies/ bacteria/ algae/ metabolism/ enzymes/ microbiological analysis/ surface films/ sediment analysis/ meiobenthos/ enzymatic activity/ biofilms/ Network design/ Ecological techniques and apparatus/ Methods and instruments
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1608. **Subsurface drip irrigation: A review.**
Camp, C. R.
*Transactions of the ASAE* 41 (5): 1353-1367. (Sept. 1998-Oct. 1998)
*NAL Call #:* 290.9-Am32T;
*ISSN:* 0001-2351 [TAAEAJ]
*Descriptors:* trickle irrigation/ subsurface irrigation/ literature reviews
*Abstract:* A comprehensive review of published information on subsurface drip irrigation was performed to determine the state of the art on the subject. Subsurface drip irrigation has been a part of drip irrigation development in the USA since its beginning about 1960, but interest has escalated since the early 1980s. Yield response for over 30 crops indicated that crop yield for subsurface drip was greater than or equal to that for other irrigation methods, including surface drip, and required less water in most cases. Lateral depths ranged from 0.02 to 0.70 m and lateral spacings ranged from 0.25 to 5.0 m. Several irrigation scheduling techniques, management strategies, crop water requirements, and water use efficiencies were discussed. Injection of nutrients, pesticides, and other chemicals to modify water and soil conditions is an important component of subsurface drip irrigation. Some mathematical models that simulate water movement in subsurface drip systems were included. Uniformity measurements and methods, a limited assessment of root intrusion into emitters, and estimates of overall system longevity were also discussed. Sufficient information exists to provide general guidance with regard to design, installation, and management of subsurface drip irrigation systems. A significant body of information is available to assist in determining relative advantages and disadvantages of this technology in comparison with other irrigation types. Subsurface drip provides a more efficient delivery system if water and nutrient applications are managed properly. Waste water application, especially for turf and landscape plants, offers great potential. Profitability and economic aspects have not been determined conclusively and will depend greatly on local conditions and constraints, especially availability and cost of water.
This citation is from AGRICOLA.

1609. **Subsurface Drip Irrigation of Row Crops: A Review of 15 Years of Research at the Water Management Research Laboratory.**
Ayars, J. E.; Phene, C. J.; Hutmacher, R. B.; Davis, K. R.; Schoneman, R. A.; Vail, S. S.; and Mead, R. M.
*Agricultural Water Management* 42 (1): 1-27. (1999)
*NAL Call #:* S494.5.W3A3;
*ISSN:* 0378-3774
*Descriptors:* Drip Irrigation/ Subsurface Irrigation/ Agriculture/ Literature Review/ Water Management/ Fertilizers/ Water Table/ Groundwater/ Research Priorities/ Conservation in agricultural use
*Abstract:* Use of subsurface drip irrigation (SDI) has progressed from being a novelty employed by researchers to an accepted method of irrigation of both perennial and annual crops. This paper reviews the SDI research conducted by scientists at the Water Management Research Laboratory over a period of 15 years. Data are presented for irrigation and fertilization management on tomato, cotton, sweet corn, alfalfa, and cantaloupe for both plot and field applications. Results from these studies demonstrated significant yield and water use efficiency increases in all crops. Use of high frequency irrigation resulted in reduced deep percolation and increased use of water from shallow ground water when crops were grown in high water table areas. Uniformity studies demonstrated that after 9 years of operation SDI uniformity was as good as at the time of installation if management procedures were followed to prevent root intrusion.
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1610. **Subsurface flow constructed wetlands for wastewater treatment: A technology assessment.**
Reed, Sherwood C.
Washington, D.C.: U.S. Environmental Protection Agency, Office of Water; 1 v. (various pagings): ill. (1993)
*Notes:* "Mr. Sherwood C. Reed ... was the principal author and editor of this document"--P. i. "July 1993." "EPA 832/R-93-008." "PB94-107893"--Cover. Includes bibliographical references.
*NAL Call #:* TD756.5.R44--1993
*Descriptors:* Constructed wetlands
This citation is from AGRICOLA.

1611. **Summary of national standards and guidelines for pesticides in water, bed sediment, and aquatic organisms and their application to water-quality assessments.**
Nowell, Lisa H.; Resek, Elizabeth A.; Geological Survey (U.S.); and United States. Environmental Protection Agency.
Sacramento, Calif.: U.S. Geological Survey; vi, 115 p.: ill.; Series: U.S. Geological Survey open-file report 94-44. (1994)
*Notes:* Open-File Report 94-44; Spine title: National standards and guidelines for pesticides in water, bed sediment, and aquatic organisms. Includes bibliographical references (p. 48-51).
*NAL Call #:* SB970.4.U6N69--1994
*Descriptors:* Pesticides---Government policy---United States/ Pesticides---Law and legislation---United States/ Pesticides---Environmental aspects---United States/ Water---United States---Pesticide content
This citation is from AGRICOLA.

1612. **Summary of research and development needs for monitoring forest and rangeland ecosystems.**
Powell, D. S.
In: North American Workshop on Monitoring for Ecological Assessment of Terrestrial and Aquatic Ecosystems = Taller Norteamericano Sobre Monitoreo para la Evaluacion Ecologica de Ecosistemas Terrestres y Acuaticos. (Held 18 Sep 1995-22 Sep 1995 at Mexico City, Mexico.) Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station; pp. 295-296; 1996.
*NAL Call #:* aSD11.A42-no.284
*Descriptors:* forests/ rangelands/ ecosystems/ environmental assessment/ monitoring/ information needs/ research / cooperation/ spatial variation/ temporal variation/ sampling/ quality controls/ information/ government organizations
This citation is from AGRICOLA.

1613. **Supercritical fluid extraction as a useful method for pesticides determination.**
Camel, V
*Analusis* 26 (6): M99-M111. (1998)
*NAL Call #:* QD71.A52;
*ISSN:* 0365-4877
*Descriptors:* benzoic acid pesticides: determination, extraction, pollutant/ organochlorine pesticides: determination, pollutant, extraction/ organophosphorus pesticides: determination, pollutant, extraction/ organotin pesticides: determination, extraction, pollutant/ pesticides: determination, pollutant, extraction/ phenoxyacetic acid pesticides: determination, extraction, pollutant/ substituted urea pesticides: determination, pollutant, extraction/ thiolcarbamate pesticides: determination, extraction, pollutant/ triazine pesticides: determination, extraction, pollutant/ triazole pesticides: determination, pollutant, extraction / animal tissue/ food/ plant tissues/ sediments/ soils/ water
*Abstract:* Supercritical fluid extraction (SFE) has faced a growing interest in the past few years, due to its numerous advantages over classical liquid solvent extractions (mainly rapidity, selectivity, low solvent volumes required). In particular, applications of this technique have been reported for the determination of pesticides in complex matrices, such as soils and sediments, water samples (after a solid-phase extraction), plant materials, animal tissues, and food items. In fact, SFE of pesticides represents quite a challenge due to the wide range of polarity encountered and the variety of matrices that may contain those residues. Consequently, extraction parameters need to be carefully chosen. So, this paper details the main strategies possible for efficient extractions of pesticides from several matrices.
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1614. **Supercritical fluid extraction for the analysis of pesticide residues in miscellaneous samples.**
Motohashi, Noboru; Nagashima, Hideo; and Parkanyi, Cyril
*Journal of Biochemical and Biophysical Methods* 43 (1-3): 313-328. (2000);
*ISSN:* 0165-022X
*Descriptors:* pesticide residues: analysis, extraction, food contaminant/ biological tissues/ fruits/ soils/ vegetables
*Abstract:* Supercritical fluid extraction (SFE) procedures for pesticide residue analysis are reviewed and discussed. A variety of applications were classified, on matrices such as fruits, vegetables, soils, biological tissues, and other materials. Emphasis is placed on analysis of samples with a high water content containing polar pesticides, with particular attention paid to the multiresidue analyses.
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1615. **Surface Flow Constructed Wetlands: Overview.**
Kadlec, R. H.
*Water Science and Technology* 32 (3): 1-12. (1995)
*NAL Call #:* TD420.A1P7;
*ISSN:* 0273-1223.
*Notes:* Monograph: 0-08-042878-9; Conference: 4. Int. Conf. on Wetlands Systems for Water Pollution Control [Selected Proceedings], Ghangzhou (People's Rep. China), 6-10 Nov 1994; Source: Wetland Systems for Water Pollution Control 1994. Selected Proceedings for the 4th International Conference on Wetland Systems for Water Pollution Control Held in Guangzhou, China 6-10 November, 1994., 1995, Pp. 1-12, Water Science and Technology [Water Sci. Technol.], Vol. 32, No. 3
*Descriptors:* wetlands / hydrology/ fluid flow/ marshes/ wastewater treatment/ nutrients (mineral)/ surface runoff/ artificial wetlands/ water quality control/ design criteria/ Dynamics of lakes and rivers/ Mechanical and natural changes/ Wastewater treatment processes/ Freshwater pollution
*Abstract:* Several hundreds of marshes have now been built primarily for the purposes of water quality improvement. This paper reviews statistics on the types and numbers and character of these low-tech water treatment wetlands. The

operational processes are discussed, including sedimentation, plant uptake, sorption, nutrient cycling, and chemical and microbial conversion. Performance has been good for reduction of suspended solids, biological oxygen demand, phosphorus, nitrogen, metals and some anthropogenic chemicals. Design procedures are evaluated, showing that the overly simplistic techniques used in the infancy of the technology may now be replaced by rational procedures based on the large and rapidly growing information base for constructed surface flow treatment wetlands. Ancillary wildlife and human use is an important part of this type of wetland, and should be acknowledged in design. Capital costs are low, but the principal financial advantage is the extremely low base cost of operation.


1616. **Survey of livestock influences on stream and riparian ecosystems in the western United States.**
Belsky, A. J.; Matzke, A.; and Uselman, S.
*Journal of Soil and Water Conservation* 54 (1): 419-431. (1999)
*NAL Call #:* 56.8 J822;
*ISSN:* 0022-4561


1617. **Survival of pathogenic microorganisms and parasites in excreta, manure and sewage sludge: A review.**
Strauch D
*Medycyna Weterynaryjna* 49 (3): 117-121; 66 ref. (1993).
*Notes:* Subtitle: Part II


1618. **Suspended clay's effect on lake and reservoir limnology.**
Lind, Owen T
*Archiv fuer Hydrobiologie Supplement* 139 (3): 327-360. (2003)
*Descriptors:* ions/ polar organic molecules/ toxic materials: food chain entry, sedimentation, suspended clay adsorption/ algae (Algae): filterable/ animal (Animalia): filter feeders/ bacteria (Bacteria): filterable/ fish (Pisces)/ macrophyte (Plantae): production/ plankton (Organisms): production/ zooplankton (Animalia)/ Algae/ Animals/ Bacteria/ Chordates/ Eubacteria/ Fish/ Microorganisms/ Nonhuman Vertebrates/ Nonvascular Plants/ Organisms/ Plants/ Vertebrates/ adsorbed organic material: concentrated bacterial substrate source/ benthic production/ clay crystals: physical layered structure/ clays: chemical properties, physical properties/ grazer assimilation/ lake limnology: suspended clay impacts/ light attenuation/ limnological system properties/ mixing depth/ reservoir limnology: suspended clay impacts/ sediment resuspension/ stratification/ suspended clay/ thermal regimes/ trophic state/ water chemistry
*Abstract:* Many reservoirs and some lakes have significant quantities of suspended clay that is primarily derived from the watershed, but subsequently from sediment resuspension. Both the physical and chemical properties of clays affect other limnological system properties. The physical layered structure of the different clay crystals presents greatly different surfaces for adsorption of ions and polar organic molecules. Adsorption of nutrients acts as either a sink or a source relative to biotic use depending upon water chemistry and trophic state. Toxic materials may be adsorbed to suspended clay and then either be directed into the food chain or removed from the system by sedimentation. Suspended clay lessens autotrophy. It competes with autotrophs for nutrients and is the principal cause of light attenuation in many waters. Thus it significantly governs plankton, benthic and macrophyte production. Clay in suspension may either facilitate or inhibit filter feeding animals. Adsorbed organic material provides a concentrated source of bacterial substrate as well as food for zooplankton and small fishes. But, high concentrations can dilute the concentration of filterable cells (algae, bacteria) and lessen grazer assimilation. Suspended clay is significant in determining community structure. Light attenuation governs the relative abundance of sight-feeding predators and their prey and thus is significant in structuring aquatic communities. In addition to light attenuation, suspended clay affects thermal regimes, and consequently mixing depth and time of stratification which in turn can affect the quantity of resuspended clay.


1619. **Sustainability, conservation tillage and weeds in Canada.**
Derksen, D A; Blackshaw, R E; and Boyetchko, S M
*Canadian Journal of Plant Science* 76 (4): 651-659. (1996)
*NAL Call #:* 450-C16;
*ISSN:* 0008-4220
*Descriptors:* bacteria (Bacteria General Unspecified)/ crop (Angiospermae)/ fungi (Fungi Unspecified)/ fungus (Fungi Unspecified)/ insect (Insecta Unspecified)/ plant (Plantae Unspecified)/ rhizobacteria (Bacteria General Unspecified)/ weeds (Tracheophyta)/ Insecta (Insecta Unspecified)/ Plantae (Plantae Unspecified)/ angiosperms/ animals/ arthropods/ bacteria/ eubacteria/ fungi/ insects/ invertebrates/ microorganisms/ nonvascular plants/ plants/ spermatophytes/ vascular plants/ agriculture/ biobusiness/ biological control/ biological control agent/ conservation tillage/ crop residue/ herbicide/ integrated management systems/ pest/ pest management/ soil science/ sustainability
*Abstract:* The sustainability of conservation tillage is dependent on the extent of changes in weed community composition, the usage of herbicides, and the development of integrated weed management (IWM) strategies, including biological weed control. The objective of this paper is to review research on conservation tillage and weed management in light of these factors. Recent Canadian research has found that changes in weed communities due to the adoption of conservation tillage are not necessarily those expected and were not consistent by species, location, or year. Changes reflected the use of different selection pressures, such as different crop rotations and herbicides, within the studies to a greater extent than weed life cycle groupings. Therefore, research that determines the reasons for change or the lack of change in weed communities is required to provide the scientific basis for the development of IWM strategies. Documented herbicide usage in conservation tillage varies from less than to more than conventional-tillage systems. Potential to reduce herbicide usage in conservation-tillage systems exists. Furthermore, the herbicides used in western Canada are different from those causing ground water contamination in the United States,

are less volatile, and are used at lower rates. The presence of surface crop residues in conservation tillage may provide a unique environment for classical and inundative biological control agents. Some insects, fungi, and bacteria have the potential to survive to a greater extent in undisturbed plant residues. Residue management and conservation tillage systems are evolving in Canada. Research must keep pace by providing weed management strategies that enhance the sustainability of these systems.


1620. **Sustainability in agriculture: An evaluation of principal goal-oriented concepts to close the gap between theory and practice.**
Wiren Lehr, S. von.
*Agriculture, Ecosystems and Environment* 84 (2): 115-129. (Apr. 2001)
*NAL Call #:* S601.A34;
*ISSN:* 0167-8809 [AEENDO]
*Descriptors:* agriculture/ sustainability/ guidelines/ land management/ crop management/ evaluation/ indicators/ agricultural production/ environmental protection/ ecology/ literature reviews
*Abstract:* The objective of concepts to assess and implement sustainability in agriculture is to consolidate the complex and diverse principles of the theoretical paradigm and to transform them into recommendations for agricultural practice. Since only goal-oriented concepts show a high adaptation to different conditions and target groups, their fundamental strategy was highlighted and their suitability for successful operationalisation was worked out. Seven goal-oriented concepts, representing the main current methods of sustainability assessment, were evaluated regarding potential and drawbacks for a successful transfer of the theoretical paradigm into practice. A principal strategy of goal-oriented concepts has been identified in all concepts: goal definition, indicator selection, evaluation based on indicator sets and final formulation of management advice. In most of the seven reviewed concepts, the protection of the agricultural production system itself is postulated as a major aim. Consequently, indicator sets mainly consist of production-oriented indicators and eco-balancing predominantly represents the methodological framework. Six of the seven selected concepts base sustainability assessment on an evaluation strategy with estimated threshold values or margins of tolerance. Three main drawbacks of goal-oriented concepts have been identified that restrict to transfer the theoretical sustainability paradigm into agricultural practice: (1) the lack of systemic and transferable indicators which characterise agricultural and other eco-systems regarding all dimensions of sustainability; (2) the deficit of an adequate evaluation of agro-ecosystems; and (3) the lack of principal guidelines for the. formulation of management advice for practical application. Goal-oriented concepts based on models for agronomy and management show a high potential to overcome these drawbacks and therefore represent a promising tool to bridge the gap between theory and practice of sustainability in agriculture.
This citation is from AGRICOLA.

1621. **Sustainability of irrigation: An overview of salinity problems and control strategies.**
Rhoades, J. D. and Salinity Laboratory (U.S.)., 1997.
*Notes:* Caption title. Paper presented at the 1997 annual conference, footprints of humanity: reflections on fifty years of water resource developments, held in Lethbridge, Alberta, June 3-6, 1997. Includes bibliographical references.
*NAL Call #:* aS613.R56-1997
http://www.ussl.ars.usda.gov/pdfpubl/p1506.pdf
*Descriptors:* Irrigation Management/ Soils, Salts in/ Irrigation water/ Soils, Irrigated
This citation is from AGRICOLA.

1622. **Sustainability of soil use.**
Buol, S. W.
*Annual Review of Ecology and Systematics* 26: 25-44. (1995)
*NAL Call #:* QH540.A55;
*ISSN:* 0066-4162 [ARECBC]
*Descriptors:* sustainability/ agricultural land/ crop production/ soil fertility/ soil exhaustion/ ecosystems/ soil degradation/ erosion/ reviews/ agroecosystems
This citation is from AGRICOLA.

1623. **Sustainable agriculture systems.**
Hatfield, Jerry L. and Karlen, D. L.
Boca Raton: Lewis Publishers; 316 p.: ill. (1994)
*NAL Call #:* S494.5.S86S86--1994;
*ISBN:* 1566700493 (acid-free paper)
*Descriptors:* Sustainable agriculture/ Agricultural systems/ Agricultural ecology
This citation is from AGRICOLA.

1624. **Sustained productivity in intensively managed forest plantations.**
Fox, T. R.
*Forest Ecology and Management* 138 (1/3): 187-202. (2000)
*NAL Call #:* SD1.F73;
*ISSN:* 0378-1127
This citation is provided courtesy of CAB International/CABI Publishing.

1625. **Sustaining biological diversity in early successional communities: The challenge of managing unpopular habitats.**
Askins, Robert A
*Wildlife Society Bulletin* 29 (2): 407-412. (2001)
*NAL Call #:* SK357.A1W5;
*ISSN:* 0091-7648
*Descriptors:* beauty perceptions/ biological diversity: sustenance/ conservation priorities/ early successional communities/ forest clearing/ habitat destruction/ habitat disturbance/ regional variation/ shrubland declines/ unpopular habitat management/ wetlands protection


1626. **Swine manure odor control using pit additives: A review.**
Zhu Jun; Bundy DS; Li XiWei; Rashid N; Zhu J; and Li XW.
In: Livestock Environment V: Proceedings of the Fifth International Symposium. (Held 29 May 1997-31 May 1997 at Bloomington, Minnesota.) Bottcher RW and Hoff SJ (eds.); Vol. 2.
St. Joseph, Mich.: American Society of Agricultural Engineers; pp. 295-302; 1997.
This citation is provided courtesy of CAB International/CABI Publishing.

1627. **A synthesis of carbon sequestration, carbon emissions, and net carbon flux in agriculture: Comparing tillage practices in the United States.**
West, T. O. and Marland, G.
*Agriculture, Ecosystems and Environment* 91 (1/3): 217-232. (Sept. 2002)
*NAL Call #:* S601 .A34;
*ISSN:* 0167-8809 [AEENDO]
*Descriptors:* agriculture/ tillage/ carbon/ emission/ carbon cycle/ deforestation/ fuel consumption/ farm management/ pesticides/ irrigation/ farm machinery/ estimation/ estimates/ no-tillage/ soil organic matter/ conservation/ carbon dioxide/ literature reviews/ United States
*Abstract:* The atmospheric CO2 concentration is increasing, due primarily to fossil-fuel combustion and deforestation. Sequestering atmospheric C in agricultural soils is being advocated as a possibility to partially offset fossil-fuel emissions. Sequestering C in agriculture requires a change in management practices, i.e. efficient use of pesticides, irrigation, and farm machinery. The C emissions associated with a change in practices have not traditionally been incorporated comprehensively into C sequestration analyses. A full C cycle analysis has been completed for agricultural inputs, resulting in estimates of net C flux for three crop types across three tillage intensities. The full C cycle analysis includes estimates of energy use and C emissions for primary fuels, electricity, fertilizers, lime, pesticides, irrigation, seed production, and farm machinery. Total C emissions values were used in conjunction with C sequestration estimates to model net C flux to the atmosphere over time. Based on US average crop inputs, no-till emitted less CO2 from agricultural operations than did conventional tillage, with 137 and 168 kg C ha(-1) per year, respectively. Changing from conventional tillage to no-till is therefore estimated to both enhance C sequestration and decrease CO2 emissions. While the enhanced C sequestration will continue for a finite time, the reduction in net CO2 flux to the atmosphere, caused by the reduced fossil-fuel use, can continue indefinitely, as long as the alternative practice is continued. Estimates of net C flux, which are based on US average inputs, will vary across crop type and different climate regimes. The C coefficients calculated for agricultural inputs can be used to estimate C emissions and net C flux on a site-specific basis.
This citation is from AGRICOLA.

1628. **A systems engineering approach for utilizing animal manure.**
Karlen, D. L.; Russel, J. R.; and Mallarino, A. P.
In: Animal waste utilization: Effective use of manure as a soil resource/ Hatfield, J. L. and Stewart, B. A., 1998; pp. 283-315
*NAL Call #:* S655.A57 1998
This citation is provided courtesy of CAB International/CABI Publishing.

1629. **Technical and commercial aspects of biocontrol products.**
Powell, K. A. and Jutsum, A. R.
*Pesticide Science* 37 (4): 315-321. (1993)
*NAL Call #:* SB951.P47;
*ISSN:* 0031-613X [PSSCBG].
*Notes:* Paper presented at the meeting, "Biological Control: Use of Living Organisms in the Management of Invertebrate Pests, Pathogens and Weeds," October 19-20, 1992, London, England. Includes references.
*Descriptors:* biological control agents/ microbial pesticides/ world markets/ applications/ regulations/ pest control/ industry/ literature reviews
*Abstract:* The global agrochemical market in 1991 was $26800 million, yet biological products were reported to account for only $120 million of sales per annum-less than 0.5% of the total. The majority of these sales are attributed to bio-insecticides of which Bacillus thuringiensis accounts for over 90%, but B. thuringiensis could be described as a biologically produced insecticide, rather than a true biocontrol agent. Biological products have technical limitations, including extreme specificity, sensitivity to environmental factors and problems with robustness of the formulations, but ironically, it is these limitations which also give biological control an image of environmental acceptability. Nonetheless, some of the limitations will be overcome and sales will increase, but primarily in niche situations such as the control of soil-borne diseases and the control of insect pests showing resistance to agrochemicals. In order for significant inroads to be made into such niche markets it is imperative that progress with biological products is not impaired by over-regulation, and a rational approach by all regulatory bodies is required. Overall, though, agrochemicals are likely to continue to be the major method of crop protection for the foreseeable future, and the biological control field now needs clear, well-defined goals if current successful niche products can be the basis for future success rather than a limited experiment in alternative technology.
This citation is from AGRICOLA.

1630. **Techniques for restoration of disturbed coastal wetlands of the Great Lakes.**
Wilcox, D. A. and Whillans, T. H.
*Wetlands* 19 (4): 835-857. (1999)
*NAL Call #:* QH75.A1W47;
*ISSN:* 0277-5212.
*Notes:* Conference: Temperate Wetlands Restoration Workshop, Barrie, ON (Canada), 27 Nov-1 Dec 1995; Publisher: Society of Wetlands Scientists
*Descriptors:* North America/ Wetlands/ Degradation/ Environmental Quality/ Land Reclamation/ Land Management/ Hydrology/ Water Control/ Environmental restoration/ Methodology/ Coastal environments/ North America, Great Lakes/ Restoration/ Sedimentation/ Community composition/ Water levels/ Pollution control/ Sediment pollution/ Decomposition/ Environmental quality standards/ Land restoration/ North America, Great Lakes/ North America/ land restoration/ Watershed protection/ Reclamation/ Protective measures and control/ Water Resources and Supplies
*Abstract:* A long history of human-induced degradation of Great Lakes wetlands has made restoration a necessity, but the practice of wetland restoration is relatively new, especially in large lake systems. Therefore, we compiled tested methods and developed additional potential methods based on scientific understanding of Great Lakes wetland ecosystems to provide an overview of approaches for restoration. We addressed this challenge by focusing on four general fields of science: hydrology, sedimentology, chemistry, and biology. Hydrologic remediation methods include restoring hydrologic connections between diked and hydrologically altered wetlands and the lakes, restoring water tables

lowered by ditching, and restoring natural variation in lake levels of regulated lakes Superior and Ontario. Sedimentological remediation methods include management of sediment input from uplands, removal or proper management of dams on tributary rivers, and restoration of protective barrier beaches and sand spits. Chemical remediation methods include reducing or eliminating inputs of contaminants from point and non-point sources, natural sediment remediation by biodegradation and chemical degradation, and active sediment remediation by removal or by in situ treatment. Biological remediation methods include control of non-target organisms, enhancing populations of target organisms, and enhancing habitat for target organisms. Some of these methods were used in three major restoration projects (Metzger Marsh on Lake Erie and Cootes Paradise and Oshawa Second Marsh on Lake Ontario), which are described as case studies to show practical applications of wetland restoration in the Great Lakes. Successful restoration techniques that do not require continued manipulation must be founded in the basic tenets of ecology and should mimic natural processes. Success is demonstrated by the sustain -ability, productivity, nutrient-retention ability, invasibility, and biotic interactions within a restored wetland.


1631. **Techniques for simultaneous quantification of wind and water erosion in semiarid zones.**
Visser, S. M. and Sterk, G.
In: Soil erosion research for the 21st century: Proceedings of the International Symposium. (Held 3 Jan 2001-5 Jan 2001 at Honolulu, Hawaii.) Ascough, J. C. and Flanagan, D. C. (eds.)
St Joseph, Mo.: American Society of Agricultural Engineers; pp. 544-547; 2001. *ISBN:* 1-892769-16-6
This citation is provided courtesy of CAB International/CABI Publishing.

1632. **Technologies and management practices for more efficient manure handling: A committee report.**
Mellano, Valerie J.; Meyer, Deanne Morse.; University of California, Davis. Animal Agricultural Research Center; and University of California, Davis. Agricultural Issues Center.
Davis, Calif.: UCD Animal Agriculture Research Center: UC Agricultural Issues Center; iv, 48 p. (1996)
*Notes:* Includes bibliographical references (p. 43-46).
*NAL Call #:* S655-.T43-1996
*Descriptors:* Manure handling/ Manures---Management/ Agricultural wastes---Management/ Farm manure ---Management
This citation is from AGRICOLA.

1633. **Temperate freshwater wetlands: Types, status, and threats.**
Brinson, M. M. and Malvarez, A. I.
*Environmental Conservation* 29 (2): 115-133. (June 2002)
*NAL Call #:* QH540.E55;
*ISSN:* 0376-8929
*Descriptors:* Wetlands / Land Use/ Environmental Protection/ Environmental Quality/ Eutrophication/ Water Quality/ Drainage/ Resources Management/ Ecosystem analysis/ Temperate environments/ Environmental degradation/ General/ Management/ Wetlands
*Abstract:* This review examines the status of temperate-zone freshwater wetlands and makes projections of how changes over the 2025 time horizon might affect their biodiversity. The six geographic regions addressed are temperate areas of North America, South America, northern Europe, northern Mediterranean, temperate Russia, Mongolia, north-east China, Korea and Japan, and southern Australia and New Zealand. Information from the recent technical literature, general accounts in books, and some first-hand experience provided the basis for describing major wetland types, their status and major threats. Loss of biodiversity is a consequence both of a reduction in area and deterioration in condition. The information base for either change is highly variable geographically. Many countries lack accurate inventories, and for those with inventories, classifications differ, thus making comparisons difficult. Factors responsible for losses and degradation include diversions and damming of river flows, disconnecting floodplain wetlands from flood flows, eutrophication, contamination, grazing, harvests of plants and animals, global warming, invasions of exotics, and the practices of filling, dyking and draining. In humid regions, drainage of depressions and flats has eliminated large areas of wetlands. In arid regions, irrigated agriculture directly competes with wetlands for water. Eutrophication is widespread, which, together with effects of invasive species, reduces biotic complexity. In northern Europe and the northern Mediterranean, losses have been ongoing for hundreds of years, while losses in North America accelerated during the 1950s through to the 1970s. In contrast, areas such as China appear to be on the cusp of expanding drainage projects and building impoundments that will eliminate and degrade freshwater wetlands. Generalizations and trends gleaned from this paper should be considered only as a starting point for developing world-scale data sets. One trend is that the more industrialized countries are likely to conserve their already impacted, remaining wetlands, while nations with less industrialization are now experiencing accelerated losses, and may continue to do so for the next several decades. Another observation is that countries with both protection and restoration programmes do not necessarily enjoy a net increase in area and improvement in condition. Consequently, both reductions in the rates of wetland loss and increases in the rates of restoration are needed in tandem to achieve overall improvements in wetland area and condition.


1634. **Temperate Zone Fens of the Glaciated Midwestern USA.**
Amon, J. P.; Thompson, C. A.; Carpenter, Q. J.; and Miner, J.
*Wetlands* 22 (2): 301-317. (2002)
*NAL Call #:* QH75.A1W47;
*ISSN:* 0277-5212.
*Notes:* Publisher: The Society of Wetland Scientists; DOI: 10.1043/0277-5212(2002)022(0301:TZFOTG)2.0.CO;2
*Descriptors:* USA/ Wetlands/ Glaciers/ Temperate Zone/ Boreal Forests/ Literature Review/ Species Diversity/ Groundwater/ Hydrogen Ion Concentration/ Root Zone/ Organic Matter/ Conductivity/ Fens/ Inland water environment/ Classification systems/ Hydrology/ Physicochemical properties/ community composition/ species diversity/ Habitat community studies

*Abstract:* A study of more than 70 fens in the Midwestern United States and a review of the literature indicates that these temperate zone wetlands may differ from fens of the boreal zone and are not adequately differentiated from them by present classification systems. Fens of the Midwestern temperate zone 1) are wetlands with high botanical diversity, 2) are supported in part by ground water with conductivity > 100mS/cm and circumneutral pH, 3) contain water in the root zone during most of the growing season yet are not usually inundated, and 4) accumulate organic and/or carbonate substrates. Individually, none of these descriptors is adequate to distinguish fens from other wetland communities of the Midwest such as marshes, sedge meadows, and wet prairies; yet, when they are taken together, such discrimination is possible. While fens of this zone share many species, our study does not support using indicator species because too few are both faithfully represented and geographically widespread. Midwestern temperate fens are sustained by forces of climate, landscape, and geology, which permit ground water to seep continuously into the root zone in a focused location. Since water availability in the temperate Midwest is less than in the boreal zone, continuous discharge is needed to maintain the saturation conducive to peat formation.


1635. **Temporary ponds and their invertebrate communities.**
Williams, D Dudley
*Aquatic Conservation* 7 (2): 105-117. (1997);
*ISSN:* 1052-7613
*Descriptors:* Aerial colonization/ Agricultural drainage/ Aquatic phase/ Competition/ Conservation/ Freshwater ecology/ Length/ Life history modification / Microcrustacean/ Migration/ Odonates/ Physiological tolerance/ Predation/ Seasonality/ Temporary ponds/ Water disappearance/ birds (Aves Unspecified)/ chironomids (Diptera)/ crustaceans (Crustacea Unspecified)/ mites (Acarina)/ snails (Gastropoda)/ springtails (Collembola)/ Aves (Aves Unspecified)/ Coleoptera (Coleoptera)/ Crustacea (Crustacea Unspecified)/ Hemiptera (Hemiptera)/ Odonata (Odonata)/ animals/ arthropods/ birds/ chelicerates/ chordates/ crustaceans/ insects/ invertebrates/ mollusks/ nonhuman vertebrates/ vertebrates/ Northeast North America/ Northwest Australia/ Britain/ UK
*Abstract:* 1. Temporary waters are bodies of water that experience a recurrent dry phase of varying length that is sometimes predictable in its onset and duration. The maximum number of temporary and permanent ponds in England and Wales in 1880 is estimated to be gt 1 million. A 1920s survey showed lowest densities in mountainous areas (0.12 km-2) and highest densities in ancient woodland and ancient agriculture areas (115 km-2). 2. The most important physical and chemical influences on the biota of temporary ponds are the length of the aquatic phase, pattern of disappearance of the water, and whether the latter is predictable or unpredictable. Biological influences include the degree of inter/intraspecific competition and predation, and the seasonal influx of aerial colonizers. 3. Temporary ponds from Britain, northeastern North America and northwestern Australia are compared and, despite large differences in climate and zoogeography, considerable similarity is evident amongst their faunas. Snails, microcrustaceans, aquatic mites, springtails, odonates, chironomids, and a high diversity of Hemiptera and Coleoptera are characteristic of these habitats. British ponds share at least 33 genera and three species with their North American counterparts. The three main evolved strategies by which invertebrates survive in temporary ponds are physiological tolerance, life history modification, and migration. populations in these ponds. 5. Agricultural drainage and pond 'improvement' schemes are seen as distinct threats to the survival of temporary ponds and should be reviewed in the context that these water bodies are not 'wasted' areas of land but natural features of the environment. It is recommended that the management of wetlands in Britain should be directed towards maintaining a high diversity of natural water bodies, including a variety of temporary pond types.


1636. **Testing a conceptual model of soil emissions of nitrous and nitric oxides.**
Davidson, Eric A; Keller, Michael; Erickson, Heather E; Verchot, Louis V; and Veldkamp, Edzo
*Bioscience* 50 (8): 667-680. (2000)
*NAL Call #:* 500 Am322A;
*ISSN:* 0006-3568
*Descriptors:* nitric oxides: pollutant, toxin/ nitrous oxides: pollutant, toxin/ soil nitrogen: availability/ conceptual models/ disciplinary research/ ecotoxicology/ global warming/ habitat alteration/ microbial ecology/ nutrient cycling/ soil emissions


1637. **Theoretical and practical challenges to an IPM approach to weed management.**
Buhler, D. D.; Liebman, M.; and Obrycki, J. J.
*Weed Science* 48 (3): 274-280. (May 2000-June 2000)
*NAL Call #:* 79.8-W41;
*ISSN:* 0043-1745 [WEESA6]
*Descriptors:* weeds/ weed control/ integrated pest management/ cropping systems/ herbicides/ conservation tillage/ erosion/ yield losses/ evolution/ plant communities/ selection pressure/ agricultural research/ literature reviews
This citation is from AGRICOLA.

1638. **Threats to imperiled freshwater fauna.**
Richter, B. D.; Braun, D. P.; Mendelson, M. A.; and Master, L. L.
*Conservation Biology* 11 (5): 1081-1093. (Oct. 1997)
*NAL Call #:* QH75.A1C5;
*ISSN:* 0888-8892
*Descriptors:* USA/ population decline/ freshwater environments/ aquatic animals/ conservation/ environmental stress/ Anthropogenic factors/ Pollution effects/ Eutrophication/ Sediment load/ River engineering/ Agricultural pollution/ Introduced species/ Freshwater fish/ Aquatic insects/ Freshwater molluscs/ Freshwater crustaceans/ Amphibiotic species/ Ecosystem disturbance/ Nature conservation/ Inland water environment/ United States/ Environmental Effects/ Regulated Rivers/ Sedimentation/ Exotic Species/ Hydrological Regime/ Mussels/ Fish/ Dams/ United States/ Conservation/ Effects on organisms/ Ecological impact of water development

*Abstract:* Threats to imperiled freshwater fauna in the U.S. were assessed through an experts survey addressing anthropogenic stressors and their sources. Specifically, causes of historic declines and current limits to recovery were identified for 135 imperiled freshwater species of fishes, crayfishes, dragonflies and damselflies, mussels, and amphibians. The survey was designed to identify threats with sufficient specificity to inform resource managers and regulators faced with translating information about predominant biological threats into specific, responsive actions. The findings point to altered sediment loads and nutrient inputs from agricultural nonpoint pollution; interference from exotic species; and altered hydrologic regimes associated with impoundment operations as the three leading threats nationwide, accompanied by many lesser but still significant threats. Variations in threats among regions and among taxa were also evident. Eastern species are most commonly affected by altered sediment loads from agricultural activities, whereas exotic species, habitat removal/damage, and altered hydrologic regimes predominate in the West. Altered sediment loading from agricultural activities and exotic species are dominant problems for both eastern mussels and fishes. However, eastern fishes also appear to be suffering from municipal nonpoint pollution (nutrients and sediments), whereas eastern mussels appear to be more severely affected by altered nutrient impacts from hydroelectric impoundments and agricultural runoff. Our findings suggest that control of nonpoint source pollution associated with agriculture activities should be a very high priority for agricultural producers and governmental support programs. Additionally, the large number of hydropower dams in the U.S. subject to federal re-licensing in coming years suggests a significant opportunity to restore natural hydrologic regimes in the affected rivers.


1639. **Threats to waterbirds and wetlands: Implications for conservation, inventory and research.**
O'Connell, Mark
*Wildfowl* 51: 1-15. (2000);
*ISSN:* 0954-6324
*Descriptors:* waterbirds (Aves)/ Animals/ Birds/ Chordates/ Nonhuman Vertebrates/ Vertebrates/ biodiversity/ conservation implications/ demographic changes/ economic changes/ human activity/ social changes/ wetlands: habitat
*Abstract:* The world has undergone major social, economic and demographic changes in the last two centuries. Predictions suggest that during the next 100 years, even greater changes will occur and this will put increasing pressure on wetlands and their biodiversity. This paper examines the changes that have occurred, and the nature of threats facing waterbirds and wetlands as a result of human activities. The need for specific areas of research is identified, particularly in relation to detecting and measuring change and the need to provide solution-oriented research to underpin conservation action.


1640. **Tillage and allelopathic aspects of the corn-soybean rotation effect.**
Anderson, I. C. and Cruse, R. M.
In: Allelopathy: Organisms, processes, and applications/ Inderjit; Dakshini, K. M. M.; and Einhellig, F. A.; Series: ACS Symposium Series 582.
Washington, D.C.: American Chemical Society, 1995; pp. 184-192.
*ISBN:* 0-8412-3061-7


1641. **Tillage and crop residue management practices for sustainable dryland farming systems.**
Unger, P. W.; Schomberg, H. H.; Dao, T. H.; and Jones, O. R.
*Annals of Arid Zone* 36 (3): 209-232. (1997);
*ISSN:* 0570-1791


1642. **Tillage and fertilizing effects on sandy soils: Review and selected results of long-term experiments at Humboldt-University, Berlin.**
Ellmer F; Peschke H; Kohn W; Chmielewski FM; and Baumecker M
*Journal of Plant Nutrition and Soil Science* 163 (3): 267-272; 29 ref. (2000)
*NAL Call #:* 384 Z343A


1643. **Tillage, mineralization and leaching: Phosphate.**
Addiscott, T. M. and Thomas, D.
*Soil and Tillage Research* 53 (3/4): 255-273. (2000)
*NAL Call #:* S590.S48;
*ISSN:* 0167-1987


1644. **A total system approach to sustainable pest management.**
Lewis, W. J.; Van Lenteren, J. C.; Phatak, S. C.; and Tumlinson, J. H.
*Proceedings of the National Academy of Sciences* 94 (23): 12243-12248. (1997);
*ISSN:* 0027-8424
*Descriptors:* reviews/ pest control/ crops/ agriculture/ Pest control/ Agricultural & general applied entomology
*Abstract:* A fundamental shift to a total system approach for crop protection is urgently needed to resolve escalating economic and environmental consequences of combating agricultural pests. Pest management strategies have long been dominated by quests for "silver bullet" products to control pest outbreaks. However, managing undesired variables in ecosystems is similar to that for other systems, including the human body and social orders. Experience in these fields substantiates the fact that therapeutic interventions into any system are effective only for short term relief because these externalities are soon "neutralized" by countermoves within the system. Long term resolutions can be achieved only by restructuring and managing these systems in ways that maximize the array of "built-in" preventive strengths, with therapeutic tactics serving strictly as backups to these natural regulators. To date, we have failed to incorporate this basic principle into the mainstream of pest management science and continue to

regress into a foot race with nature. In this report, we establish why a total system approach is essential as the guiding premise of pest management and provide arguments as to how earlier attempts for change and current mainstream initiatives generally fail to follow this principle. We then draw on emerging knowledge about multitrophic level interactions and other specific findings about management of ecosystems to propose a pivotal redirection of pest management strategies that would honor this principle and, thus, be sustainable. Finally, we discuss the potential immense benefits of such a central shift in pest management philosophy.


1645. **Toward Quantifying Water Pollution Abatement in Response to Installing Buffers on Crop Land.**
Dosskey, M. G.
*Environmental Management* 28 (5): 577-598. (2001)
*NAL Call #:* HC79.E5E5;
*ISSN:* 0364-152X
*Descriptors:* Water pollution control/ Agricultural runoff/ Nonpoint pollution/ Filtration/ Literature Review / Cultivated Lands/ Nonpoint Pollution Sources/ Best Management Practices/ Runoff/ Research Priorities/ Pollution control/ Agricultural pollution/ Buffers/ Environment management/ Pollution monitoring/ Rivers/ Lakes/ Land use/ Erosion control/ Surface water/ Evaluation/ buffer strips/ crop land buffers/ Freshwater pollution/ Water quality control/ Protective measures and control
*Abstract:* The scientific research literature is reviewed (i) for evidence of how much reduction in nonpoint source pollution can be achieved by installing buffers on crop land, (ii) to summarize important factors that can affect this response, and (iii) to identify remaining major information gaps that limit our ability to make probable estimates. This review is intended to clarify the current scientific foundation of the USDA and similar buffer programs designed in part for water pollution abatement and to highlight important research needs. At this time, research reports are lacking that quantify a change in pollutant amounts (concentration and/or load) in streams or lakes in response to converting portions of cropped land to buffers. Most evidence that such a change should occur is indirect, coming from site-scale studies of individual functions of buffers that act to retain pollutants from runoff: (1) reduce surface runoff from fields, (2) filter surface runoff from fields, (3) filter groundwater runoff from fields, (4) reduce bank erosion, and (5) filter stream water. The term filter is used here to encompass the range of specific processes that act to reduce pollutant amounts in runoff flow.


1646. **Towards a Unified System for Detecting Waterborne Pathogens.**
Straub, T. M. and Chandler, D. P.
*Journal of Microbiological Methods* 53 (2): 185-197. (2003)
*NAL Call #:* QR65.J68;
*ISSN:* 0167-7012.
*Notes:* Publisher: Elsevier Science B.V.; DOI: 10.1016/S0167-7012(03)00023-X
*Descriptors:* Pathogens/ Microbiological Studies/ Water Analysis/ Public Health/ Water Sampling/ Water Quality/ Detection/ Samples/ Purification/ Reviews/ Identification of pollutants/ Other water systems
*Abstract:* Currently, there is no single method to collect, process, and analyze a water sample for all pathogenic microorganisms of interest. Some of the difficulties in developing a universal method include the physical differences between the major pathogen groups (viruses, bacteria, protozoa), efficiently concentrating large volume water samples to detect low target concentrations of certain pathogen groups, removing co-concentrated inhibitors from the sample, and standardizing a culture-independent endpoint detection method. Integrating the disparate technologies into a single, universal, simple method and detection system would represent a significant advance in public health and microbiological water quality analysis. Recent advances in sample collection, on-line sample processing and purification, and DNA microarray technologies may form the basis of a universal method to detect known and emerging waterborne pathogens. This review discusses some of the challenges in developing a universal pathogen detection method, current technology that may be employed to overcome these challenges, and the remaining needs for developing an integrated pathogen detection and monitoring system for source or finished water.


1647. **Towards more rigorous assessment of biodiversity.**
Vanclay, J. K.
In: Assessment of biodiversity for improved forest planning: Proceedings of the Conference on Assessment of Biodiversity for Improved Planning. (Held 7 Oct 1996-11 Oct 1996 at Monte Verita, Switzerland.) Bachmann, P.; Kohl, M.; and Paivinen, R. (eds.)
Dordrecht: Kluwer Academic Publishers; pp. 211-232; 1998.
*NAL Call #:* SD1.F627-v.51;
*ISBN:* 0792348729
*Descriptors:* biodiversity/ assessment/ surveys/ sampling/ forest inventories/ literature reviews/ mathematical models/ habitats/ ecosystems/ indexes
This citation is from AGRICOLA.

1648. **Toxicity and Bioaccumulation of Sediment-Associated Contaminants Using Freshwater Invertebrates: A Review of Methods and Applications.**
Ingersoll, C. G.; Ankley, G. T.; Benoit, D. A.; Brunson, E. L.; Burton, G. A.; Dwyer, F. J.; Hoke, R. A.; Landrum, P. F.; Norberg-King, T. J.; and Winger, P. V.
*Environmental Toxicology and Chemistry* 14 (11): 1885-1894. (1995)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268
*Descriptors:* reviews/ bioaccumulation/ Hyalella azteca/ Chironomus tentans/ Lumbriculus variegatus/ sediments/ freshwater ecosystems/ contaminants/ toxicity testing/ benthos/ invertebrates/ toxicity/ analytical methods/ bioassays/ pollution effects/ pollution tolerance/ toxicity tests/ water pollution/ sediment pollution/ chironomidae/ Diptera/ Toxicology and health/ Effects of pollution/ Methods and instruments/ Toxicology & resistance
*Abstract:* This paper reviews recent developments in methods for evaluating the toxicity and bioaccumulation of contaminants associated with freshwater sediments and summarizes example case studies demonstrating the application of these methods. Over the past

decade, research has emphasized development of more specific testing procedures for conducting 10-d toxicity tests with the amphipod Hyalella azteca and the midge Chironomus tentans. Toxicity endpoints measured in these tests are survival for H. azteca and survival and growth for C. tentans. Guidance has also been developed for conducting 28-d bioaccumulation tests with the oligochaete Lumbriculus variegatus, including determination of bioaccumulation kinetics for different compound classes. These methods have been applied to a variety of sediments to address issues ranging from site assessments to bioavailability of organic and inorganic contaminants using field-collected and laboratory-spiked samples. Survival and growth of controls routinely meet or exceed test acceptability criteria. Results of laboratory bioaccumulation studies with L. variegatus have been confirmed with comparisons to residues (PCBs, PAHs, DDT) present from synoptically collected field populations of oligochaetes. Additional method development is currently underway to develop chronic toxicity tests and to provide additional data-confirming responses observed in laboratory sediment tests with natural benthic populations.


1649. **Toxicity of mixtures of pesticides in aquatic systems.**
Deneer, John W
*Pest Management Science* 56 (6): 516-520. (2000)
*NAL Call #:* SB951-.P47;
*ISSN:* 1526-498X
*Descriptors:* algae (Algae)/ insects (Insecta)/ molluscs (Mollusca)/ Algae/ Animals/ Arthropods/ Insects/ Invertebrates/ Microorganisms/ Mollusks/ Nonvascular Plants/ Plants/ aquatic systems
*Abstract:* The paper assesses the usefulness of the concept of 'concentration addition' (CA) for describing the joint effect of pesticides on aquatic organisms, based on literature data from 1972 to 1998. For more than 90% of 202 mixtures in 26 studies, CA was found to predict effect concentrations correctly within a factor of two. Although from a theoretical point of view the assumption of CA may be invalid when dealing with mixtures of compounds with dissimilar modes of action, the experimental results have usually been indistinguishable from that predicted by CA. Deviations from CA did occur, but were mostly limited in extent. Upward and downward deviations from CA were of comparable magnitude and frequency, and tended to cancel each other out. The combinations identified as most frequently leading to deviations from CA were those of an organophosphorus ester or a carbamate with either another organophosphorus ester or a synthetic pyrethroid.


1650. **Toxicity of Pesticides to Aquatic Microorganisms: A Review.**
Delorenzo, M. E.; Scott, G. I.; and Ross, P. E.
*Environmental Toxicology and Chemistry* 20 (1): 84-98. (2001)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268
*Descriptors:* Aquatic microorganisms/ Reviews/ Pesticides/ Herbicides/ Atrazine/ Photosynthesis/ Pollution effects/ Toxicology/ Estuarine organisms/ Bioaccumulation/ Toxicity/ Decomposition/ Estuaries/ Ecosystems/ Microorganisms/ Toxicity/ Pesticides/ Ecology/ Micro organisms/ Aquatic organisms/ Bacteria/ Protozoa/ Toxicity testing/ Environmental impact/ Effects on organisms/ Effects of pollution/ Effects of Pollution/ Toxicology and health
*Abstract:* Microorganisms contribute significantly to primary production, nutrient cycling, and decomposition in estuarine ecosystems; therefore, detrimental effects of pesticides on microbial species may have subsequent impacts on higher trophic levels. Pesticides may affect estuarine microorganisms via spills, runoff, and drift. Both the structure and the function of microbial communities may be impaired by pesticide toxicity. Pesticides may also be metabolized or bioaccumulated by microorganisms. Mechanisms of toxicity vary, depending on the type of pesticide and the microbial species exposed. Herbicides are generally most toxic to phototrophic microorganisms, exhibiting toxicity by disrupting photosynthesis. Atrazine is the most widely used and most extensively studied herbicide. Toxic effects of organophosphate and organochlorine insecticides on microbial species have also been demonstrated, although their mechanisms of toxicity in such nontarget species remain unclear. There is a great deal of variability in the toxicity of even a single pesticide among microbial species. When attempting to predict the toxicity of pesticides in estuarine ecosystems, effects of pesticide mixtures and interactions with nutrients should be considered. The toxicity of pesticides to aquatic microorganisms, especially bacteria and protozoa, is an area of research requiring further study.


1651. **Toxicology and ecotoxicology of persistent organic microcontaminants in aquatic systems.**
Miniero, R.; Dellatte, E.; and Domenico, A. di
*Annali dell'Istituto Superiore di Sanitŕ* 38 (2): 131-135. (2002);
*ISSN:* 0021-2571


1652. **Trace and toxic metals in wetlands: A review.**
Gambrell, R. P.
*Journal of Environmental Quality* 23 (5): 883-891. (Sept. 1994-Oct. 1994)
*NAL Call #:* QH540.J6;
*ISSN:* 0047-2425 [JEVQAA].
*Notes:* Paper presented at the symposium, "Wetland Processes and Water Quality," November 3-4, 1992, Minneapolis, MN. Includes references.
*Descriptors:* wetland soils/ upland soils/ heavy metals/ leaching/ immobilization/ soil ph/ redox reactions/ bioavailability/ plants
*Abstract:* The mobility and plant availability of many trace and toxic metals in wetland soils is often substantially different from upland soils. Oxidation-reduction (redox) and associated pH changes that occur in soils as a result of flooding or drainage can affect the retention and release of metals by clay minerals, organic matter, iron oxides, and, for coastal wetlands, sulfides. Except where a Hooded soil or sediment becomes strongly acid upon drainage and oxidation, as sometimes occurs, the processes immobilizing metals tend to be complimentary such that large-scale metal releases from contaminated soils and sediments do not occur with changing redox conditions. Metals tend to be retained

more strongly in wetland soils compared with upland soils.
This citation is from AGRICOLA.

1653. **Trace element inputs into soils by anthropogenic activities and implications for human health.**
Senesi, G. S.; Baldassarre, G.; Senesi, N.; and Radina, B.
*Chemosphere* 39 (2): 343-377. (July 1999)
*NAL Call #:* TD172.C54;
*ISSN:* 0045-6535 [CMSHAF].
*Notes:* Special issue: Matter and energy fluxes in the anthropocentric environment / edited by N. Senesi, J.A. Rice, and T.M. Miano. Paper presented at the XIII International Symposium on Environmental Biogeochemistry held September 21-26, 1997, Monopoli (Bari), Italy. Includes references.
*Descriptors:* soil pollution/ polluted soils/ trace elements/ air pollution/ air pollutants/ deposition/ fertilizers/ liming materials/ agricultural chemicals/ sewage sludge/ organic amendments/ irrigation water/ toxicity/ man/ literature reviews
This citation is from AGRICOLA.

1654. **Trace-level detection and identification of polar pesticides in surface water: The SAMOS approach.**
Brinkman, U A T; Slobodnik, J; and Vreuls, J J
*Trends in Analytical Chemistry* 13 (9): 373-381. (1994)
*NAL Call #:* QD71.T7;
*ISSN:* 0165-9936
*Descriptors:* analytical method/ drinking water/ gas chromatography/ liquid chromatography/ water pollution
© Thomson

1655. **Trace-level determination of pesticides in water by means of liquid and gas chromatography.**
Geerdink, R B; Niessen, W M A; and Brinkman, U A Th
*Journal of Chromatography A* 970 (1-2): 65-93. (2002)
*NAL Call #:* QD272.C4J68;
*ISSN:* 0021-9673
*Descriptors:* pesticide: water pollutant/ pesticide transformation product/ carrot: vegetable/ cauliflower: vegetable/ ground water/ onion: vegetable/ water pollution
*Abstract:* The trace-level determination of pesticides and their transformation products (TPs) in water by means of liquid and gas chromatography (LC and GC) is reviewed. Special attention is given to the use of (tandem) mass spectrometry for identification and confirmation purposes. The complementarity of LC- and GC-based techniques and the potential of comprehensive GCXGC are discussed, and also the impressive performance of time-of-flight mass spectrometry. It is also indicated that, in the near future, the TPs rather than the parent compounds should receive most attention-with a better understanding of matrix effects and eluent composition on the ionization efficiency of analytes being urgently required. Finally, the merits of using much shorter LC columns, or even no column at all (flow-injection analysis) in target analysis are shown, and a more cost-efficient and sophisticated strategy for monitoring programmes is briefly introduced.
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1656. **Trail Degradation as Influenced by Environmental Factors: A State-of-the-Knowledge Review.**
Leung, Yu-Fai and Marion, J. L.
*Journal of Soil and Water Conservation* 51 (2): 130-136. (1996)
*NAL Call #:* 56.8 J822;
*ISSN:* 0022-4561
*Descriptors:* drainage patterns/ degradation/ land use/ recreation/ national parks/ soil erosion/ trails/ Erosion and sedimentation
*Abstract:* Human use and misuse of land has been causing extensive degradation of the very natural resources on which we depend. National parks, wilderness and other protected natural or semi-natural areas (referred to as natural areas hereafter) represent efforts to preserve our natural heritage from further exploitation. Such areas also provide outstanding recreational, research, and educational opportunities. However, resource impacts resulting from overuse and inappropriate management increasingly threaten these protected areas and erode their natural and cultural values. Among the many forms of recreational impact, those associated with trail development and use are often a major concern of natural area managers and visitors. Such impacts impair and degrade the functions that trails serve, including (1) protecting resources by concentrating traffic on a hardened tread, (2) providing recreational opportunities along aesthetically pleasing trail routes, and (3) facilitating recreational use by providing a transportation network. The extensive distribution of trails and their degrading condition in many natural areas can have pervasive environmental effects through alteration of natural drainage patterns, erosion and deposition of soil, introduction of exotic vegetation, and increasing human-wildlife conflicts. Degraded trails also threaten the quality of visitor experiences by making travel difficult or unsafe, or by diminishing visitors' perceptions of naturalness.
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1657. **Transfer of phosphorus from agricultural soils.**
Haygarth PM and Jarvis SC
*Advances in Agronomy* 66: 195-249. (1999)
*NAL Call #:* 30-Ad9
This citation is provided courtesy of CAB International/CABI Publishing.

1658. **Transformations of pesticides in the atmosphere: A state of the art.**
Atkinson, Roger; Guicherit, Rob; Hites, Ronald A; Palm, Wolf Ulrich; Seiber, James N; and De, Voogt Pim
*Water, Air and Soil Pollution* 115 (1-4): 219-243. (1999)
*NAL Call #:* TD172.W36;
*ISSN:* 0049-6979
*Descriptors:* pollutants/ toxins/ alpha hexachlorocyclohexane/ chloropicrin/ cis 1,3 chloropropane/ cycloate/ gamma hexachlorocyclohexane/ hexachlorobenzene/ hydroxide radicals/ methyl bromide/ methyl isothiocyanate/ parathion/ phorate/ phosphine/ trans 1,3 chloropropane/ trifluralin/ EPTC/ 1,2 dibromo 3 chloropropane/ atmospheric lifetimes/ atmospheric removal rates/ chemical reactions/ ecotoxicology/ particle phase/ pesticide transformation/ physical reactions/ reaction rates
*Abstract:* The current knowledge about transformation rates and products of pesticides in the atmosphere is reviewed. Reactive species and their concentrations in the atmosphere are presented. Reactions of pesticides with these species (including photolysis) in the gas and the particulate phase are evaluated from available experimental data. The potential of estimation methods is discussed. Experimental

techniques for laboratory and outdoor measurements are reviewed. Finally, an estimation is made of uncertainties in atmospheric lifetimes due to chemical or physical reactions. It is concluded that the most important transformation of pesticides in the atmosphere is due to reaction with OH radicals. Very few experimental data for pesticides are available though. The levels of uncertainty in OH radical concentrations are acceptable, however, for a proper estimation of atmospheric removal rates due to reactions with OH radicals of those pesticides for which experimental transformation rates (of homologues) are available.


1659. **Transgenics, pest management, and the environment.**
Sharma, H. C. and Ortiz, R.
*Current Science* 79 (4): 421-437. (2000)
*NAL Call #:* 475 SCI23;
*ISSN:* 0011-3891
*Descriptors:* Sustainable development/ Pest control/ Environmental protection/ Bacillus thuringiensis/ Transgenic plants/ Transgenic animals/ Reviews/ Pest resistance/ Bacillus thuringiensis/ Insecta/ Environmental action/ Agricultural & general applied entomology/ General Environmental Engineering
*Abstract:* Genetic engineering of crop plants to confer resistance to insect pests offers an environmental friendly method of crop protection. Impressive results have been obtained with the expression of Bacillus thuringiensis (Bt) and other toxin genes in several crops. However, both exotic and plant-derived genes have some performance limitations, and there have been some failures in insect control through transgenic crops. The production and deployment of transgenic crops for pest control need to address the issues related to impact of the transgenic crops on the insect pests, ecological cost of resistance development, effects on the nontarget organisms, availability and distribution of the alternate host plants, and the potential for introgression of genes into the wild relatives of crops. There is a need for a more responsible public debate and better presentation of the benefits for a rational deployment of the genetically-transformed plants for sustainable crop production.


1660. **Transport of bacteria from manure and protection of water resources.**
Unc, A. and Goss, M. J.
*Applied Soil Ecology* 25 (1): 1-18. (2004)
*NAL Call #:* QH541.5.S6A67;
*ISSN:* 0929-1393.
*Notes:* Number of References: 119
*Descriptors:* Agriculture/ Agronomy/ soil/ manure/ bacterial persistence/ surface chemistry/ escherichia coli/ soil columns/ organic contaminants/ surface properties/ aquifer sediments/ preferential flow/ fecal bacteria/ liquid manure/ porous media/ vadose zone
*Abstract:* Survival and transport of pathogens from manure in the environment depend on a number of complex phenomena. An important question is how the properties of such a complex environment as the soil-manure medium impact the persistence of bacteria within the vadose zone. First, manure can change the partitioning of precipitation water between infiltration (enhanced by solid manure) and surface runoff (stimulated by liquid manure). Components of manure, such as straw and coarse organic matter, can strain and filter micro-organisms from the transporting water. After infiltrating the soil, the retention of bacteria depends on the physical configuration of soil, the soil chemistry, and the properties of the microbial cells. Transport of bacteria in soils obeys the general laws pertinent to macropore flow and the interaction between particles and surfaces of variable charge. Detailed characterisation of the variable properties within the structured soil profile is a difficult task. Application of manure can result in significant changes in the physical and electrochemical properties of the soils and microbial cells. Such changes can affect the interaction between bacterial cells and soils in several ways: increase filtration, modify the kinetics of the physico-chemical interactions between charged surfaces, and alter the competition for retention sites between suspended soluble and particulate compounds. Survival of faecal bacteria is affected by the physical and chemical conditions existing prior to manure application as well as by conditions imposed by mixing soil and manure. Competitive interaction with native soil bacteria, in the soil-manure mixtures, is an important aspect governing survival of introduced organisms. (C) 2003 Elsevier B.V. All rights reserved.


1661. **Treatment lagoons for animal agriculture.**
Hamilton, D. W.; Fathepure, B.; Fulhage, C.; Clarkson, W.; and Laiman, J.
In: White papers on animal agriculture and the environment/ National Center for Manure & Animal Waste Management; Midwest Plan Service; and U.S. Department of Agriculture; Raleigh, NC: National Center for Manure & Animal Waste Management, 2001.
*NAL Call #:* TD930.2-.W45-2002
*Descriptors:* Agricultural wastes---Environmental aspects---United States

1662. **Treatment of acid mine drainage by sulphate-reducing bacteria using permeable reactive barriers: A review from laboratory to full-scale experiments.**
Gibert, O; de, Pablo J; Cortina, J L; and Ayora, C
*ReViews in Environmental Science and BioTechnology* 1 (4): 327-333. (2002);
*ISSN:* 1569-1705
*Descriptors:* sulfate reducing bacteria (Bacteria): biological control agent/ Bacteria/ Eubacteria/ Microorganisms/ acid mine drainage/ permeable reactive barrier


1663. **Treatment of irrigation effluent water to reduce nitrogenous contaminants and plant pathogens.**
MacDonald, James D. and United States Israel Binational Agricultural Research and Development Fund.
Bet Dagan, Israel: BARD; ii, 47 leaves: ill. (1997)
*Notes:* Final report. Project no. IS-2122-92. Includes bibliographical references (leaves 22-24).
*NAL Call #:* TD930.T68--1997
*Descriptors:* Agricultural wastes/ Land treatment of wastewater
This citation is from AGRICOLA.

1664. **Treatment wetlands.**
Kadlec, Robert H. and
Knight, Robert L.
Boca Raton: Lewis Publishers; 893 p.: ill., maps. (1996)
*Notes:* Includes bibliographical references (p. 839-880) and index.
*NAL Call #:* TD755.K33--1996;
*ISBN:* 0873719301 (acid-free paper)
*Descriptors:* Sewage---Purification---Biological treatment/ Wetlands
This citation is from AGRICOLA.

1665. **Tree Shelters and Weed Control Increase the Survivorship of Riparian Plantings.**
Anon.
*Watershed Protection Techniques* 1 (1): 26. (1994);
*ISSN:* 1073-9610
*Descriptors:* Pennsylvania/ White Clay Creek/ seedlings/ weed control/ reforestation/ revegetation/ riparian vegetation/ monitoring/ reviews/ trees/ Control of water on the surface/ United States
*Abstract:* The Stroud Water Research Center has recently completed a long-term research project on the best techniques to establish native riparian forest buffers along streams in the Piedmont watersheds of Pennsylvania. Sweeney (1993) indicates that poor survival can be expected for planted seedlings, due to competition from weeds, drought, and animal predation. He stresses that weed control (twice annual mowing or careful application of herbicides) was the major factor influencing survival rates of seedlings.
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1666. **Tree windbreaks and shelter benefits to pasture in temperate grazing systems. [Erratum: 1998, v. 42 (2), p. 211.].**
Bird, P. R.
*Agroforestry Systems* 41 (1): 35-54. (1998)
*NAL Call #:* SD387.M8A3;
*ISSN:* 0167-4366 [AGSYE6].
*Notes:* Special issue: Windbreaks in support of agricultural production in Australia / edited by R. Prinsley. Includes references.
*Descriptors:* shelterbelts/ trees/ pastures/ grazing systems/ temperate climate/ forage/ grasses/ livestock/ performance/ growth/ plant competition/ plant height/ species differences/ spatial distribution/ literature reviews
This citation is from AGRICOLA.

1667. **Trees outside forests: Agro, community, and urban forestry.**
Long, A. J. and Nair, P. K. R.
*New Forests* 17/18 (1/3/1): 145-174. (1999)
*NAL Call #:* SD409.N48;
*ISSN:* 0169-4286.
*Notes:* Special issue: Planted forests: Contributions to the quest for sustainable societies / edited by J. R. Boyle, J. Winjum, K. Kavanagh and E. Jensen. Paper presented at a symposium held June 1995, Portland, Oregon. Includes references.
*Descriptors:* forest trees/ agroforestry/ forest plantations/ social forestry/ urban forestry/ community forestry/ sustainability/ private forestry/ genotype mixtures/ agricultural research/ subsistence/ land use/ profitability/ species diversity/ shifting cultivation/ home gardens/ literature reviews
*Abstract:* Planted forests are often considered to consist of tree plantings at a scale large enough to satisfy such objectives as commercial production of timber and fiber, protection of watersheds, and preservation of natural habitats. However, trees are planted also at greatly reduced scales in agroforestry systems or as community woodlots to provide a mixture of products and services to resident households, local communities, and regional cultures. Agroforestry systems represent a major form of small-scale tree planting, where trees are grown in purposeful combinations with agricultural crops and/or livestock in order to take advantage of tree-crop interactions, and thereby enhance crop production, diversify farm output, stabilize or improve soils, or ameliorate harsh environmental conditions. Some important examples of these systems in tropical countries include homegardens, alley cropping, improved fallows, intercropped trees for shade and fodder production, and trees planted in hedgerows and along fence lines. Throughout the tropics, there is a large variety of indigenous practices and species mixtures that represent adaptations of these systems to meet localized needs and opportunities. Research and development programs have supported the expansion and refinement of many of these systems during the last 20 years, but substantial constraints on tree planting still exist in the form of land-tenure practices, population pressures that relegate agroforestry practices to degraded lands, subsistence needs that prevent extended periods of tree growth, and insufficient technical information or technology dissemination. Agroforestry systems in temperate, industrialized. countries include combinations of trees, pasture, and livestock; fruit or nut trees interplanted with vegetable or grain crops; windbreaks and shelterbelts; multispecies riparian buffer strips; and forest farming systems for specialty crops. Compared to the tropics, however, temperate-zone systems tend to focus on one or two high-value crops, often involve some level of mechanization, and frequently represent an opportunistic approach to improving the economic profitability of farms rather than meeting subsistence needs. In both tropical and temperate regions, agroforestry systems and community woodlots will be an important component of new sustainable agriculture and environmental protection programs. Although species diversity is an essential feature of all agroforestry systems, community forests generally involve planting only a few species in small woodlots near farms, around villages, along roads, and as riparian buffers. Provincial or state governments and the local populace are often involved in landownership and plantation establishment. Major objectives of these forests are production of fuelwood for local consumption and of other tree products for market; soil stabilization, reclamation, or improvement; and protection of water quality. As with many other planted forests, the number of species widely used in community forests has been relatively small, with the genera Eucalyptus, Pinus, and Acacia providing the bulk of the species. Major issues with these 'planted forests' focus on rights for use of the products, tending responsibilities since trees are established, protection until trees are large enough for their designated use, increasing interest in using "native" species, and greater community involvement in planning and management. Trees planted along streets and waterways, or as woodlots in parks and other public places, represented a major group of planted forests in many urban and periurban landscapes. In addition providing of the same environmental services that agroforests and community forests do, these urban plantings have

unique aesthetic and recreational value. For much of the world's ever-increasing urban population, these may be the only tangible reference points for understanding planted forests. These relatively little-recognized forms of planted forests-planted trees, to be more appropriate--are now receiving much greater attention. There are, however, some serious technical and sociopolitico-institutional constraints to their development as more widely adopted systems in both tropical and temperate regions.
This citation is from AGRICOLA.

1668. **Trends in nutrients.**
Heathwaite AL; Johnes PJ; and Peters NE
*Hydrological Processes* 10 (2): 263-293; many ref. (1996)
*NAL Call #:* GB651.H93
This citation is provided courtesy of CAB International/CABI Publishing.

1669. **Trends in tillage practices in relation to sustainable crop production with special reference to temperate climates.**
Cannell, R. Q. and Hawes, J. D.
*Soil and Tillage Research* 30 (2/4): 245-282. (1994)
*NAL Call #:* S590.S48;
*ISSN:* 0167-1987
This citation is provided courtesy of CAB International/CABI Publishing.

1670. **Turbidity, Suspended Sediment, and Water Clarity: A Review.**
Davies-Colley, R. J. and Smith, D. G.
*Journal of the American Water Resources Association* 37 (5): 1085-1102. (2001)
*NAL Call #:* GB651.W315;
*ISSN:* 1093-474X
*Descriptors:* Water quality (Natural waters)/ Turbidity/ Sediment/ Suspended solids/ Clarity/ Benthos/ Water Quality/ Light Penetration/ Sediments/ Transparency/ Water Quality Standards/ Suspended particulate matter/ Resuspended sediments/ Water Quality/ Water quality control/ Ocean circulation and currents
*Abstract:* Suspended sediment causes a range of environmental damage, including benthic smothering, irritation of fish gills, and transport of sorbed contaminants. Much of the impact, while sediment remains suspended, is related to its light attenuation, which reduces visual range in water and light availability for photosynthesis. Thus measurement of the optical attributes of suspended matter in many instances is more relevant than measurement of its mass concentration. Nephelometric turbidity, an index of light scattering by suspended particles, has been widely used as a simple, cheap, instrumental surrogate for suspended sediment, that also relates more directly than mass concentration to optical effects of suspended matter. However, turbidity is only a relative measure of scattering (versus arbitrary standards) that has no intrinsic environmental relevance until calibrated to a `proper' scientific quantity. Visual clarity (measured as Secchi or black disc visibility) is a preferred optical quantity with immediate environmental relevance to aesthetics, contact recreation, and fish habitat. Contrary to common perception, visual clarity measurement is not particularly subjective and is more precise than turbidity measurement. Black disc visibility is inter-convertible with beam attenuation, a fundamental optical quantity that can be monitored continuously by beam transmissometry. Visual clarity or beam attenuation should supplant nephelometric turbidity in many water quality applications, including environmental standards.
© Cambridge Scientific Abstracts (CSA)

1671. **Twenty-five year review of conservation tillage in the Southern U.S.: Perspective from industry.**
Bradley, J. F.
In: Making conservation tillage conventional: Building a future on 25 years of research -- Proceedings of 25th Annual Southern Conservation Tillage Conference for Sustainable Agriculture. (Held 24 Jun 2002-26 Jun 2002 at Auburn, AL.)
Santen, E. van (eds.)
Auburn, AL: Alabama Agricultural Experiment Station, Auburn University; pp. 20-24; 2002.
This citation is provided courtesy of CAB International/CABI Publishing.

1672. **Two-stage system for prioritizing riparian restoration at the stream reach and community scales.**
Harris, Richard and Olson, Craig
*Restoration Ecology* 5 (4 [supl.]): 34-42. (1997)
*NAL Call #:* QH541.15.R45R515;
*ISSN:* 1061-2971
*Descriptors:* plant (Plantae)/ Plants/ community structure/ geomorphology/ prioritization/ riparian restoration: community scale, stream reach scale/ riparian vegetation/ species composition
*Abstract:* This paper describes a two-stage system for prioritizing stream reaches and riparian communities along a given river for protection or restoration. The system uses associations between geomorphology and riparian vegetation at stream reach and community scales as a basis for defining reference conditions. First-stage reach classification involves collecting and analyzing data from topographic maps and aerial photographs. These data, along with judgment-based criteria for ranking reaches relative to reference conditions, are used to classify stream reaches as suitable for protection, recommended for mitigation or restoration within existing site-specific regulatory procedures, or requiring further analysis to evaluate community-scale restoration needs. Second-stage field sampling is conducted on the reaches needing further analysis to determine the riparian communities present, the associations between communities and floodplain landforms, and reference community conditions. This stage requires collection of field data on geomorphic conditions, plant species composition, and plant community structure. Cluster analysis or a comparable technique is used to classify plant communities associated with floodplain landforms and identify reference conditions for each landform. Community structure and species composition are compared to reference conditions to define restoration possibilities at the community scale. The combined results from stream reach and community scale analysis provide a strategy for protecting and restoring riparian resources for a whole river. Implementation requires further site-specific information on hydrology, geomorphology, and other factors.
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1673. **Two-toxin strategies for management of insecticidal transgenic crops: Can pyramiding succeed where pesticide mixtures have not?**
Roush, R T
*Philosophical Transactions of the Royal Society of London B: Biological Sciences* 353 (1376): 1777-1786. (1998)
*NAL Call #:* 501 L84Pb;
*ISSN:* 0962-8436
*Descriptors:* Bt toxin / Bacillus thuringiensis Bt gene (Endospore forming Gram Positives)/ cotton (Malvaceae): fiber crop/ Helicoverpa (Lepidoptera): agricultural pest/ Angiosperms/ Animals/ Arthropods/ Dicots/ Insects/ Invertebrates/ Plants/ Spermatophytes/ Vascular Plants/ insect pest resistance/ transgenic crops
*Abstract:* Transgenic insect-resistant crops that express toxins from Bacillus thuringiensis (Bt) offer significant advantages to pest management, but are at risk of losing these advantages to the evolution of resistance in the targeted insect pests. All commercially available cultivars of these crops carry only a single Bt gene, and are particularly at risk where the targeted insect pests are not highly sensitive to the Bt toxin used. Under such circumstances, the most prudent method of avoiding resistance is to ensure that a large proportion of the pest population develops on non-transgenic 'refuge' hosts, generally of the crop itself. This has generated recommendations that 20% or more of the cotton and maize in any given area should be nontransgenic. This may be costly in terms of yields and may encourage further reliance on and resistance to pesticides. The use of two or more toxins in the same variety (pyramiding) can reduce the amount of refuge required to delay resistance for an extended period. Cross-resistance among the toxins appears to have been overestimated as a potential risk to the use of pyramids (and pesticide mixtures) because cross-resistance is at least as important when toxicants are used independently. Far more critical is that there should be nearly 100% mortality of susceptible insects on the transgenic crops. The past failures of pesticide mixtures to manage resistance provide important lessons for the most efficacious deployment of multiple toxins in transgenic crops. © Thomson

1674. **U.S. soil erosion rates: Myth and reality.**
Trimble, S. W. and Crosson, P.
*Science* 289 (5477): 248-250. (2000)
*NAL Call #:* 470 Sci2;
*ISSN:* 0036-8075
This citation is provided courtesy of CAB International/CABI Publishing.

1675. **Uncertainities in current estimates of emissions of ammonia in the United Kingdom.**
Lee, D. S. and Dollard, G. J.
*Environmental Pollution* 86 (3): 267-277. (1994)
*NAL Call #:* QH545.A1E52;
*ISSN:* 0269-7491 [ENPOEK]
*Descriptors:* ammonia/ emission/ atmosphere/ animal husbandry/ sources/ pollution/ environmental impact/ vehicles/ fertilizer industry/ vegetation/ degradation/ literature reviews/ UK/ coal combustion/ waste incineration/ human sources
This citation is from AGRICOLA.

1676. **Undamming Rivers: A Review of the Ecological Impacts of Dam Removal.**
Bednarek, A. T.
*Environmental Management* 27 (6): 803-814. (2001)
*NAL Call #:* HC79.E5E5;
*ISSN:* 0364-152X
*Descriptors:* Dams/ Rivers/ Environmental restoration/ River engineering/ Restoration/ Fluvial morphology/ Habitat/ Sediment transport/ Ecosystem resilience/ Environmental impact/ Migratory species / Stream flow rate/ Cost benefit analysis/ Biota/ Regulated Rivers/ Environmental Quality/ Sediment Load/ Streamflow/ Alteration of Flow/ Pisces/ fish passage/ dam removal/ Reclamation/ Protective measures and control/ Environmental action/ Ecological impact of water development
*Abstract:* Dam removal continues to garner attention as a potential river restoration tool. The increasing possibility of dam removal through the FERC relicensing process, as well as through federal and state agency actions, makes a critical examination of the ecological benefits and costs essential. This paper reviews the possible ecological impacts of dam removal using various case studies. Restoration of an unregulated flow regime has resulted in increased biotic diversity through the enhancement of preferred spawning grounds or other habitat. By returning riverine conditions and sediment transport to formerly impounded areas, riffle/pool sequences, gravel, and cobble have reappeared, along with increases in biotic diversity. Fish passage has been another benefit of dam removal. However, the disappearance of the reservoir may also affect certain publicly desirable fisheries. Short-term ecological impacts of dam removal include an increased sediment load that may cause suffocation and abrasion to various biota and habitats. However, several recorded dam removals have suggested that the increased sediment load caused by removal should be a short-term effect. Preremoval studies for contaminated sediment may be effective at controlling toxic release problems. Although monitoring and dam removal studies are limited, a continued examination of the possible ecological impacts is important for quantifying the resistance and resilience of aquatic ecosystems. Dam removal, although controversial, is an important alternative for river restoration. © Cambridge Scientific Abstracts (CSA)

1677. **Understanding farmstead odors: An annotated review.**
Hamilton, D. W. and Arogo, J.
*Professional Animal Scientists* 15 (4): 203-210. (Dec. 1999)
*NAL Call #:* SF51.P76;
*ISSN:* 1080-7446
*Descriptors:* farmyard manure/ odors/ odor emission/ concentration/ organolepsis/ persistence/ volatile compounds/ organic acids/ organic sulfur compounds/ nitrogenous compounds/ phenols/ alcohols/ aldehydes/ ketones/ characteristics/ sensory evaluation/ literature reviews/ odor intensity
This citation is from AGRICOLA.

1678. **Understanding rangeland biodiversity.**
Blench, R.; Sommer, Florian.; and Overseas Development Institute (London, England
London: Overseas Development Institute; 52 p.: ill.; Series: Working paper (Overseas Development Institute (London, England)) no. 121. (1999)
*Notes:* "September 1999" "Results of ODI research presented in preliminary form for discussion and critical comment"--Cover. Includes bibliographical references (p. 45-52).

*NAL Call #:* SF85-.B64-1999;
*ISBN:* 0850034329
*Descriptors:* Rangelands/ Biological diversity conservation
This citation is from AGRICOLA.

1679. **Unwanted agricultural pesticides: State disposal programs.**
Centner, Terence J
*Journal of Environmental Quality* 27 (4): 736-742. (1998)
*NAL Call #:* QH540.J6;
*ISSN:* 0047-2425
*Descriptors:* pesticides: agrichemical/ environmental quality/ environmental risks/ health risks/ pesticide disposal: state programs
*Abstract:* Millions of pounds of unwanted pesticides have accumulated in storage barns throughout our country. The potential environmental and health risks posed by this situation have garnered public attention and governmental action. While the possession of unwanted pesticides generally is not illegal, agricultural producers need to follow requisite legal requirements and dispose of pesticides properly to avoid legal infractions. The federal government has published the Universal Waste Rule so that it is easier to dispose of unwanted pesticides through waste pesticide collection programs. Nearly every state has initiated efforts to collect and dispose of accumulated pesticides in a safe manner, but many programs only address a part of the problem. For many states, the lack of implementation of funding or a permanent mechanism for the collection of unwanted pesticides means that pesticides will continue to present risks to our society.
© Thomson

1680. **The Upper St. Johns River Basin Project: Merging flood control with aquatic ecosystem restoration and preservation.**
Miller, Steven J.; Lee, Mary Ann; and Lowe, Edgar F.
*Transactions of the North American Wildlife and Natural Resource Conference* 63: 156-170. (1998)
*NAL Call #:* 412.9 N814;
*ISSN:* 0078-1355
*Descriptors:* ecosystem restoration/ flood control/ floodplain management/ water quality/ wetlands/ Upper St. Johns River Basin Project/ Florida/ Conservation
© Thomson

1681. **The USDA Forest Service pesticide spray behavior and application development program: An overview.**
Barry, J. W.
*Journal of the American Mosquito Control Association* 12 (2, part 2): 342-352. (1996)
*NAL Call #:* QL536.J686;
*ISSN:* 8756-971X
This citation is provided courtesy of CAB International/CABI Publishing.

1682. **Use and reuse of saline-sodic waters for irrigation of crops.**
Goyal, S. S.; Sharma, S. K.; and Rains, D. W.
*Journal of Crop Production* 7 (1/2): 131-162. (2003)
*NAL Call #:* SB1.J683;
*ISSN:* 1092-678X
This citation is provided courtesy of CAB International/CABI Publishing.

1683. **The use of animal waste as a crop fertilizer.**
Ap Dewi, I.
In: Pollution in livestock production systems/ Ap, Dewi I.; Axford, R. F. E.; Marai, I. F. M.; and Omed, H. M., 1994; pp. 309-331
This citation is provided courtesy of CAB International/CABI Publishing.

1684. **The use of buffer zones to protect water quality: A review.**
Norris, V.
*Water Resources Management* 7 (4): 257-272. (1993)
*NAL Call #:* TC401.W27;
*ISSN:* 0920-4741 [WRMAEJ]
*Descriptors:* surface water/ runoff water/ water pollution/ pollution control/ protection/ zoning/ vegetation/ watersheds/ reviews/ Australia/ vegetated buffer zones
*Abstract:* It is popularly accepted that vegetated buffer zones are effective in removing water pollutants from surface runoff. However, there is a paucity of detailed information about establishing and maintaining buffer zones under different conditions, particularly in large catchments with diverse land uses. This paper reviews information on the application and effectiveness of vegetated buffer zones, and seeks to provide guidelines on their use for water quality control. Investigations into the use of buffer zones are grouped here into three major categories: studies of runoff plots or confined field areas; studies of operational forestry catchments; and studies of agricultural catchments. The degree of effectiveness of buffer zones for water pollution control in all these categories is generally attributed either to physical properties of the buffer zones (such as width, slope, vegetative cover, or soil type) or to the type of pollutant encountered. However, it is clear that although buffer zones have been shown to work well under small scale, experimental conditions, they lack success for water quality control on a broad catchment basis. In this respect, it is important that runoff must enter a buffer zone as shallow, overland flow in order to be slowed or detained, and that excessively channelised runoff will pass through a buffer zone unhindered. Buffer zones positioned close to sources of surface water pollution are therefore more likely to succeed in controlling water quality. It is suggested that although buffer zones are capable of removing pollutants from surface runoff, the proximity of buffer zones to sources of pollution is more important to their effectiveness than has been generally recognised. In view of this, the successful use of buffer zones for water quality control would require that they be comprehensively arranged along streams and around pollution sources in a catchment, and therefore that a large proportion of catchment area be set aside for this purpose. The real value of buffer zones in any situation would rest not only on their ability to control water quality, but on a number of other benefits and costs associated with maintaining large areas of natural vegetation.
This citation is from AGRICOLA.

1685. **Use of constructed wetlands for urban stream restoration: A critical analysis.**
Helfield, James Mark and Diamond, Miriam L
*Environmental Management* 21 (3): 329-341. (1997)
*NAL Call #:* HC79.E5E5;
*ISSN:* 0364-152X
*Descriptors:* Conservation/ Contaminant Input/ Delta Marsh Restoration/ Don River/ Toronto/ Urban Stream Restoration/ Water Quality/ Wetland Processes
*Abstract:* Investigation of a delta marsh restoration project proposed for the Don River in Toronto, Ontario, underlines several concerns about constructed wetland projects

designed for water quality improvement and aquatic habitat enhancement. The Don is a highly urbanized river that has undergone significant physiographic modifications and continually receives a complex mixture of conventional, metallic, and organic contaminants from multiple point and nonpoint sources. Rather than providing permanent removal of urban contaminants, wetland processes offer a limited capacity for temporary storage of contaminant inputs, and potential reactions may actually produce more toxic and/or bioavailable forms of some chemicals. These processes tend to result in the concentration of watershed contaminants in wetland vegetation and sediments. As the restored marsh would be available for spawning and feeding by aquatic fauna, the potential exists for chemical bioconcentration and biomagnification through the aquatic community. Accordingly, wetland systems are not suited to the dual purposes of water quality improvement and aquatic habitat enhancement. Upstream controls, including source reduction of contaminant inputs, are recommended as essential components of all constructed wetland projects.


1686. **Use of constructed wetlands to process agricultural wastewater.**
Peterson, Hans G
*Canadian Journal of Plant Science* 78 (2): 199-210. (1998)
*NAL Call #:* 450-C16;
*ISSN:* 0008-4220
*Descriptors:* nitrogen / phosphorus/ agriculture/ constructed wetland usage/ organics
*Abstract:* Constructed wetlands are emerging as a serious challenge to conventional wastewater treatment because of lower construction and operating costs, less requirement for trained personnel, more flexibility, and lower susceptibility to variations in waste loading rates. Water quality improvements can be achieved by removal of plant nutrients, such as N and P, organics (natural and man-made) as well as inorganic contaminants. Wetland treatment is now advocated by regulatory agencies and has been determined as the technology of choice by municipalities and industries required to meet stringent discharge regulations. These same regulations have not usually been imposed on the agricultural community, but deteriorating water sources will likely change this regulatory anomaly. Use of this technology in treating agricultural wastewater is still in its infancy with few, although rapidly expanding, applications. This paper aims to highlight different aspects of wetland treatment by exploring its use for the treatment of agricultural run-off as well as wastewater from the agri-food industry. It is concluded that natural wetlands will be quite limited in absorbing agricultural wastewater while constructed wetlands can be designed for optimum pollutant removal.


1687. **Use of electronic noses for detection of odour from animal production facilities: A review.**
Nimmermark, S.
*Water Science and Technology* 44 (9): 33-41. (2001)
*NAL Call #:* TD420.A1P7;
*ISSN:* 0273-1223


1688. **The use of environmental radionuclides as tracers in soil erosion and sedimentation investigations: Recent advances and future developments.**
Zapata, F.
*Soil and Tillage Research* 69 (1/2): 3-13. (2003)
*NAL Call #:* S590.S48;
*ISSN:* 0167-1987


1689. **Use of herbicide-tolerant crops as a component of an integrated weed management program.**
Knezevic, S. Z. and Cassman, K. G.
*Crop Management* (March): 0-7. (2003)


1690. **The use of higher plants as bioindicators.**
Markert, B. A.; Breure, A. M.; and Zechmeister, H. G.
In: Bioindicators and biomonitors: Principles, concepts and applications/ Markert, B. A.; Breure, A. M.; and Zechmeister, H. G., 2003; pp. 423-463.
*ISBN:* 0-08-044177-7


1691. **The use of imaging radars for ecological applications: A review.**
Kasischke, E. S.; Melack, J. M.; and Dobson, M. C.
*Remote Sensing of Environment* 59 (2): 141-156. (1997)
*NAL Call #:* Q184.R4;
*ISSN:* 0034-4257


1692. **Use of innovative tools to increase nitrogen use efficiency and protect environmental quality in crop rotations.**
Delgado, J A; Ristau, R J; Dillon, M A; Duke, H R; Stuebe, A; Follett, R F; Shaffer, M J; Riggenbach, R R; Sparks, R T; Thompson, A; Kawanabe, L M; Kunugi, A; and Thompson, K
*Communications in Soil Science and Plant Analysis* 32 (7-8): 1321-1354. (2001)
*NAL Call #:* S590.C63;
*ISSN:* 0010-3624
*Descriptors:* chlorophyll: monitoring/ nitrate: nutrient, pollutant, sap concentrations, shallow underground water table removal/ nitrogen: crop use efficiency, leaching, nutrient, pollutant/ nutrients: erosion leaching, pollutants/ grains (Gramineae): deep rooted, small/ winter cover crops (Angiospermae)/ Angiosperms/ Monocots/ Plants/ Spermatophytes/ Vascular Plants/ environmental quality: protection/ fine particles: erosion leaching/ organic matter: erosion leaching/ sandy coarse soils: nutrient leaching susceptibility/ sandy soil cropping systems: nitrogen status, nutrient balancing/ soil quality protection/ wind erosion
*Abstract:* Cropping systems grown over sandy coarse soils are susceptible to nutrient leaching due to local thunderstorms and irrigation. Additionally, erosion can contribute to removal of nutrients, soil organic matter, and fine particles. Balancing nutrients for these systems while protecting water and soil quality requires best management practices (BMPs). Crop rotations with deeper rooted small grains and winter cover crops reduced potential losses of fine particles, soil organic matter, nitrogen,

and other nutrients due to wind erosion and protected soil and water quality. The cropping system N status can be monitored by assessing chlorophyll, sap NO3--N concentrations and N indexes of the canopy. The Nitrogen Leaching Economic Analysis Package (NLEAP) model simulated residual soil NO3--N and soil water and showed that there is potential to use precision farming to improve NUE. Simulations of the system showed that BMPs increased NUE and that NO3--N can potentially be removed from the shallow underground water table protecting water quality. These results show that with the application of models, and tools to monitor the N status of the above-ground canopy, such as chlorophyl readings, sap NO3--N concentrations, N indices, and other new technologies such as precision farming and remote sensing, nutrient use efficiency in the new millennium will be significantly increased, environmental quality will be conserved, and product quality will be improved at the farm level for the benefit of producers, processors and consumers.
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1693. **The use of invertebrate soil fauna in monitoring pollutant effects.**
Cortet, J.; Gomot-de Vauflery, A.; Poinsot-Balaguer, N.; Gomot, L.; Texier, C.; and Cluzeau, D.
*European Journal of Soil Biology* 35 (3): 115-134. (1999);
*ISSN:* 1164-5563
This citation is provided courtesy of CAB International/CABI Publishing.

1694. **The use of live biocatalysts for pesticide detoxification.**
Chen, Wilfred and Mulchandani, Ashok
*Trends in Biotechnology* 16 (2): 71-76. (1998)
*NAL Call #:* TP248.13.T72;
*ISSN:* 0167-7799
*Descriptors:* biocatalysts/ Escherichia coli (Enterobacteriaceae): decomposer, genetically engineered organism/ Bacteria/ Eubacteria/ Microorganisms
*Abstract:* During the past decade, numerous microorganisms capable of degrading pesticides have been isolated, and detoxification processes based on these live biocatalysts have been developed. Recently, novel detoxification strategies using genetically engineered microorganisms with extended degradative capabilities have been investigated and, in some cases, shown to be more effective. One promising approach for the detoxification of organophosphate pesticides uses genetically engineered Escherichia coli with surface-expressed organophosphorus hydrolase. Continuous efforts in this direction are required, in conjunction with a search for microorganisms capable of degrading pesticides rapidly, to establish efficient and cost-effective large-scale processes for pesticide detoxification.
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1695. **The Use of Macrophyte-Based Systems for Phosphorus Removal: An Overview of 25 Years of Research and Operational Results in Florida.**
Debusk, T. A.; Dierberg, F. E.; and Reddy, K. R.
*Water Science and Technology* 44 (11-12): 39-46. (2001)
*NAL Call #:* TD420.A1P7;
*ISSN:* 0273-1223.
*Notes:* Conference: 7. International Conference on Wetland Systems for Water Pollution Control 2000, Lake Buena Vista, FL [USA], 11-16 Nov 2000; Source: Wetland Systems for Water Pollution Control 2000; Editors: Kadlec, R. H. //Reddy, K. R.;
*ISBN:* 1843394073
*Descriptors:* United States, Florida/ Water Pollution Control/ Wetlands/ Performance Evaluation/ Phosphorus Removal/ Macrophytes/ Case Studies/ Reviews/ Case study/ Agricultural runoff/ Wastewater treatment/ Historical account/ United States, Florida/ Water quality control/ Water Treatment/ Freshwater pollution/ Water Pollution: Monitoring, Control & Remediation/ Wastewater treatment processes
*Abstract:* Phosphorus (P) removal from wastewaters and surface runoff using macrophyte-based systems (MBS) has been a topic of great interest in Florida for over 25 years. During this period, P removal by both treatment wetlands and floating aquatic macrophyte systems has been evaluated from both a research and operational standpoint. Several factors have contributed to the increased focus on the use of MBS for P removal. First, there exist no conventional technologies that can cost-effectively achieve the low outflow P concentrations required to protect the integrity of Florida's relatively pristine surface waters. Second, because MBSs typically provide some water storage, they can accommodate the wide ranges of flows typical for runoff sources such as agricultural drainage waters. Finally, many regions in Florida have sufficient area for deployment of the relatively land-intensive MBS technologies. The first P removal work in Florida was initiated in the mid-1970s, and involved pilot-scale research on domestic wastewater treatment by natural wetlands. Parallel studies were performed with managed (periodically harvested) floating plant systems (i.e., Eichhornia crassipes) for tertiary treatment. Since that time. the range of operational systems that have been deployed include emergent macrophyte-based and forested wetlands, managed floating plant systems, and submerged macrophyte-based systems. Waters treated by MBS include domestic effluents, agricultural runoff and eutrophic lake waters. Phosphorus removal targets for MBS in Florida have been as low as 10 mu g/L. In this paper, we summarize research and operational results for MBS in Florida over the past 25 years.
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1696. **The use of macrophytes in bioremediation.**
Wood, B. and McAtamney, C.
*Biotechnology Advances* 12 (4): 653-662. (1994)
*NAL Call #:* TP248.2.B562;
*ISSN:* 0734-9750 [BIADDD].
*Notes:* Special issue: Biotechnology and industry: Present and future / edited by C.R. Barnett, J.S.G. Dooley, A.P. McHale, and P.G. McKenna. Includes references.
*Descriptors:* waste water treatment/ bioremediation/ wetlands/ reviews/ reed bed systems/ constructed wetlands
This citation is from AGRICOLA.

1697. **Use of nuclear techniques in soil erosion and siltation studies: IAEA activities.**
Zapata, F.; Garcia Agudo, E.; Hera, C.; Rozanski, K.; and Frohlich, K.
In: Nuclear techniques in soil-plant studies for sustainable agriculture and environment preservation: Proceedings of a conference. (Held 17 Oct 1994-21 Oct 1994 at Vienna, Austria.)
Vienna: International Atomic Energy Agency (IAEA); pp. 631-642; 1995.
*ISBN:* 92-0-100895-3
This citation is provided courtesy of CAB International/CABI Publishing.

1698. **Use of prescribed fire for vegetation management.**
Feller, M. C.
In: Integrated forest vegetation management: Options and applications -- Proceedings of the fifth British Columbia Forest Vegetation Management Workshop. (Held 29 Nov 1993-30 Nov 1993 at Richmond, British Columbia, Canada.) Gomeau, P. G.; Harper, G. J.; Blanche, M. E.; Boateng, J. O.; and Gilkeson, L. A. (eds.); pp. 17-34; 1996.
*Notes:* FRDA report 251;
*ISSN:* 0835-0752
*NAL Call #:* SD14.B7F7
*Descriptors:* forest management/ vegetation management/ prescribed burning/ silviculture/ ecosystems/ fire effects/ fire ecology/ plant morphology/ forest ecology/ site preparation/ fuel appraisals / plant succession/ seed banks/ pioneer species/ phenology/ seasonal variation/ literature reviews/ British Columbia
This citation is from AGRICOLA.

1699. **Use of spent mushroom substrate for growing containerized woody ornamentals: An overview.**
Chong, C. and Rinker, D. L.
*Compost Science and Utilization* 2 (3): 45-53. (Summer 1994)
*NAL Call #:* TD796.5.C58;
*ISSN:* 1065-657X.
*Notes:* Paper presented at the symposium, "Spent Mushroom Substrate, March 11-14, 1994, Philadelphia, Pennsylvania. Includes references.
*Descriptors:* ornamental woody plants/ container grown plants/ growth/ growing media/ salinity/ physicochemical properties/ leaves/ nutrient content/ waste utilization
This citation is from AGRICOLA.

1700. **USEPA biomonitoring and bioindicator concepts needed to evaluate the biological integrity of aquatic systems.**
Lazorchak, J. M.; Hill, B. H.; Brown, B. S.; McCormick, F. H.; Engle, V. D.; Lattier, D. J.; Bagley, M. J.; Griffith, M. B.; Maciorowski, A. F.; and Toth, G. P.
In: Bioindicators and biomonitors: Principles, concepts and applications/ Markert, B. A.; Breure, A. M.; and Zechmeister, H. G., 2003; pp. 831-874.
*ISBN:* 0-08-044177-7
This citation is provided courtesy of CAB International/CABI Publishing.

1701. **Users guide to description, propagation and establishment of native shrubs and trees for riparian areas in the intermountain West.**
Ogle, Daniel G.; Hoag, J. Chris.; Scianna, Joseph D.; and United States. Natural Resources Conservation Service. Plant Materials Program (U.S.).
Boise, Idaho; Bozeman, Mont.: USDA, Natural Resources Conservation Service; Series: Technical note (United States. Natural Resources Conservation Service) no. 32. (2000)
*Notes:* Title from web page. "February, 2000" "Plant Materials Program." Description based on content viewed Oct. 28, 2002. Includes bibliographical references.
*NAL Call #:* aS627.A35-O56-2000
http://plant-materials.nrcs.usda.gov/pubs/idpmctn320200.pdf
*Descriptors:* Trees---West---United States---Identification/ Riparian ecology---West---United States/ Revegetation---West---United States/ Soil conservation---West---United States/ Bioengineering---West---United States/ Erosion---West---United States
This citation is from AGRICOLA.

1702. **Using a drum composter to produce compost from cattle manure.**
Malkki S; Klemola E; and Szmidt RAK
*Acta Horticulturae* 469: 139-148. (1998).
*Notes:* Conference: Proceedings of the international symposium on composting and use of composted materials for horticulture, Auchincruive, Ayr, UK, 5-11 April 1997
This citation is provided courtesy of CAB International/CABI Publishing.

1703. **Using aerial photographs to assess proper functioning condition of riparian-wetland areas: Riparian area management.**
Prichard, Donald E.; United States. Bureau of Land Management. PFC Aerial Photo Interpretation Team; and National Applied Resource Sciences Center (U.S.).
Denver, CO: U.S. Dept. of the Interior, Bureau of Land Management, National Applied Resource Sciences Center; iii, 41 p.: col. ill., col. maps; Series: Technical reference (United States. Bureau of Land Management) 1737-12. (1996)
*Notes:* Shipping list no.: 97-0077-P. "September 1996"--Report documentation p. "BLM/RS/ST-96/007+1737"--P. [2] of cover. Includes bibliographical references (p. 19). SUDOCS: I 53.35:1737-12.
*NAL Call #:* QH541.5.R52U85--1996
*Descriptors:* Riparian areas---United States---Management/ Wetland conservation---United States/ Aerial photography in watershed management---United States
This citation is from AGRICOLA.

1704. **Using algae to assess environmental conditions in wetlands.**
Stevenson, R. Jan.; McCormick, Paul V.; Frydenborg, Russ.; United States. Environmental Protection Agency. Office of Water; United States. Environmental Protection Agency. Office Science and Technology; and United States. Environmental Protection Agency. Office of Wetlands, Oceans and Watersheds.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2002.
*Notes:* Original title: Using algae to assess environmental conditions in wetlands (#11); Title from web page. "March 2002." "Prepared jointly by U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetlands Division (Office of Wetlands, Oceans, and Watersheds)" "EPA-822-R-02-021." Description based on content viewed April 14, 2003. Includes bibliographical references.

*NAL Call #:* QH541.15.I5-S74-2002
http://www.epa.gov/waterscience/criteria/wetlands/11Algae.pdf
*Descriptors:* Indicators---Biology---United States/ Environmental indicators---United States---Mathematical models/ Algae---United States/ Wetland conservation---United States
This citation is from AGRICOLA.

1705. **Using amphibians in bioassessment of wetlands.**
Sparling, Donald W.; United States. Environmental Protection Agency. Office of Water.; United States. Environmental Protection Agency. Health and Ecological Criteria Division.; and United States. Environmental Protection Agency. Wetlands Division.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2002.
*Notes:* Using amphibians in bioassessment of wetlands. (#12).Title from web page. "March 2002." "Prepared jointly by the U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetlands Division (Office of Wetlands, Oceans, and Watersheds)" "EPA-822-R-02-022." Description based on content viewed March 31, 2003. Includes bibliographical references.
*NAL Call #:* QH541.15.I5-M472-2002
http://www.epa.gov/waterscience/criteria/wetlands/12Amphibians.pdf
*Descriptors:* Wetlands management---United States/ Indicators---Biology---United States/ Environmental indicators---United States/ Monitoring, Biological---United States/ Amphibians---United States
This citation is from AGRICOLA.

1706. **Using chorioallantoic membranes for non-lethal assessment of persistent organic pollutant exposure and effect in oviparous wildlife.**
Cobb, G. P.; Bargar, T. A.; Pepper, C. B.; Norman, D. M.; Houlis, P. D.; and Anderson, T. A.
*Ecotoxicology* 12 (1): 31-45. (2003)
*NAL Call #:* RA565.A1 E27;
*ISSN:* 0963-9292
This citation is provided courtesy of CAB International/CABI Publishing.

1707. **Using cover crops to manage arthropod pests of orchards: A review.**
Bugg, R. L. and Waddington, C.
*Agriculture, Ecosystems and Environment* 50 (1): 11-28. (1994)
*NAL Call #:* S601 .A34;
*ISSN:* 0167-8809.
*Notes:* Conference: 19. International Congress of Entomology, Beijing (People's Rep. China), 28 Jun-4 Jul 1992
*Descriptors:* orchards / biological control/ cover crops/ Agricultural & general applied entomology/ Control
*Abstract:* A review of entomological studies of cover crops for tree nuts, pome fruits, stone fruits, and citrus suggests both opportunities and challenges. Various cover crops harbor distinctive complexes of beneficial and pest arthropods, and diverse trophic relationships have been well documented in the literature. More study is required to determine: (1) whether cover cropping modifies orchard microclimate and target crop nutritional status and thereby influences pest dynamics; (2) whether and how cover crop species composition, spatial interspersion of species, and management by irrigation, mowing, and tillage affect build-up and movement of arthropods, and resultant pest damage to the target crop.


1708. **Using ecological relationships of wildlife as templates for restoring Southwestern forests.**
Reynolds, R. T.; Block, W. M.; and Boyce, D. A.
In: Conference on Adaptive Ecosystem Restoration and Management restoration of cordilleran conifer landscapes of North America. (Held 6 Jun 1996-8 Jun 1996 at Flagstaff, Arizona.)
Fort Collins, Colo.: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; pp. 35-43; 1996.
*NAL Call #:* aSD11.A42-no.278
*Descriptors:* pinus ponderosa/ wildlife/ ecosystems/ strix occidentalis/ accipiter gentilis/ endangered species/ wildlife conservation/ habitats/ predator prey relationships/ food chains/ forests/ botanical composition/ plant communities/ chains/ sustainability/ forest management/ literature reviews/ Southwestern states of United States
This citation is from AGRICOLA.

1709. **Using geochemical and statistical tools to identify irrigated areas that might contain high selenium concentrations in surface water: Irriation drainage in the western United States creates unforseen environmental problems.**
Naftz, David L. and Geological Survey (U.S.).
Washington, DC: U.S. Dept. of the Interior, National Irrigation Water Quality Program, U.S. Geological Survey; Series: Fact sheet (Geological Survey (U.S.)) FS-96-077. (1997)
*Notes:* Caption title. "August 1996." Includes bibliographical references.
*NAL Call #:* S618.6.S4N34-1997
http://water.usgs.gov/pubs/FS/FS-077-96/
*Descriptors:* Selenium---Environmental aspects---West---United States/ Irrigation water---Pollution---West---United States
This citation is from AGRICOLA.

1710. **Using nutrient uptake patterns to develop efficient nitrogen management strategies for vegetables.**
Sanchez, C. A. and Doerge, T. A.
*HortTechnology* 9 (4): 601-606. (Oct. 1999-Dec. 1999)
*NAL Call #:* SB317.5.H68;
*ISSN:* 1063-0198.
*Notes:* Proceedings of the workshop on Patterns and physiology of nutrient use in horticultural crops: Implications for fertilizer efficiency held July 11-16, 1998, Charlotte, North Carolina. Includes references.
*Descriptors:* vegetables/ crops/ nitrogen/ crop management/ nutrient uptake/ soil fertility/ leaching/ denitrification/ losses from soil/ nitrogen content/ nutrient requirements/ split dressings/ sidedressing/ controlled release/ fertigation/ irrigation/ literature reviews
*Abstract:* Nitrogen (N) in a soil that is not immediately taken up by a crop is subject to leaching, denitrification and other mechanisms of loss. Nitrogen uptake studies identify the total amount of N accumulated by the crop and the period of peak demand. This information can be used to devise management strategies aimed at

supplying N preceding anticipated uptake. Split sidedress application, fertigation, and use of controlled release fertilizers (CRN) are all viable options for N management, depending on the crop production scenario and available infrastructure. Soil and plant tissue testing can be useful feedback tools for adjusting N applications for soil contributions of N and unexpected N losses. Efficient irrigation is of paramount importance in achieving efficient N fertilization regardless of management practice. This citation is from AGRICOLA.

1711. **Using remote photography in wildlife ecology: A review.**
Cutler, T. L. and Swann, D. E.
*Wildlife Society Bulletin* 27 (3): 571-581. (1999)
*NAL Call #:* SK357.A1W5;
*ISSN:* 0091-7648
This citation is provided courtesy of CAB International/CABI Publishing.

1712. **Using the past to predict the future: Lake sediments and the modelling of limnological disturbance.**
Anderson, N John
*Ecological Modelling* 78 (1-2): 149-172. (1995)
*NAL Call #:* QH541.15.M3E25;
*ISSN:* 0304-3800
*Descriptors:* history/ mathematical modelling/ simulation/ water quality
*Abstract:* Most lakes have been disturbed to varying degrees but for an individual lake the timescale of these disturbances is rarely known. Lake sediments, however, can be used as natural archives of perturbation histories, e.g. acidification and eutrophication. At present the use of simple weighted averaging models permits the reconstruction of a variety of water chemical variables from diatom and other microfossils preserved in lake sediments (pH, total phosphorus, salinity and lakewater temperature). Sediment records can, therefore, provide lake-specific background data for lake management as well as information about their ecological histories. The common models used in paleolimnology (dating, transfer-functions) are reviewed and their role in environmental monitoring discussed. Predictions of future lake water quality following lake restoration methods tend to be made from dynamic mathematical models, but they are also used for hindcasting (e.g. the MAGIC model of catchment acidification). A problem with using dynamic models is that they are often site-specific and require calibration for a given lake. Combined with reliable dating, chemical reconstructions from microfossil-based transfer functions offer the possibility of testing hindcast predictions derived from dynamic mathematical models, e.g. for salinity, TP and pH. In this way, sediment microfossil-based models can assist with the parameterization of more complex, dynamic models of contemporary processes. In this review, comparisons between the two approaches (sediment-based and dynamic models) are given and possible future interactions outlined. Validation of mathematical models by palaeolimnological data might enhance their predictive ability when used for forecasting take recovery. There is clearly, however, a need for a more rigorous approach to paleolimnology, i.e. critical hypothesis generation. Multidisciplinary studies of lake disturbance. that combine paleolimnology, dynamic modelling and contemporary process studies, would also be beneficial.


1713. **Using vegetation to assess environmental conditions in wetlands.**
Fennessy, Slobhan.; United States. Environmental Protection Agency. Health and Ecological Criteria Division; United States. Environmental Protection Agency. Wetlands Division; and United States. Environmental Protection Agency. Office of Water.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2002.
*Notes:* Original title: Using vegetation to assess environmental conditions in wetlands (#10); Title from web page. "March 2002." Major contributors: Slobhan Fennessy and others. "Prepared jointly by the U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetlands Division (Office of Wetlands, Oceans, and Watersheds)" "EPA-822-R-02-020." Description based on content viewed March 31, 2003. Includes bibliographical references.
*NAL Call #:* QH541.15.I5-M473-2002
http://www.epa.gov/waterscience/criteria/wetlands/10Vegetation.pdf
*Descriptors:* Plant indicators---United States/ Indicators---Biology---United States/ Wetland management---United States/ Environmental monitoring---United States
This citation is from AGRICOLA.

1714. **Using water of marginal quality for crop production: Major issues.**
Shalhevet, Joseph
*Agricultural Water Management* 25 (3): 233-269. (1994)
*NAL Call #:* S494.5.W3A3;
*ISSN:* 0378-3774
*Descriptors:* plant (Plantae Unspecified)/ Angiospermae (Angiospermae)/ angiosperms/ plants/ spermatophytes/ vascular plants/ agriculture/ drainage/ fertilizer/ hydraulic conductivity/ irrigation/ soil salinity/ yield
*Abstract:* A considerable amount of data is available regarding the effect of soil salinity on crop yield. Most of the data was obtained under uniform spatial and temporal distribution of salts, at high levels of fertility and with crop established prior to the introduction of saline conditions. In practice, under realistic field conditions, uniformity is the exception rather than the rule, soil fertility may not be optimal and salinity may be present before the crop is established. In addition, crops may have different sensitivities at different stages of growth. This review attempts to answer the principal questions which are relevant to the use of marginal quality water for irrigation. Duration of exposure and stage of growth: plants are more sensitive during the seedling stage than during later stages of growth. But the preponderant temporal effect of salinity is the duration of exposure. Spatial distribution: the best estimate of the effective salinity when salt is non-uniformly distributed with depth is the mean salinity within the root zone. Under some conditions normalization on the water uptake basis is superior. Soil fertility: the level of soil fertility has no effect on the tolerance of crops to salinity. Varietal differences: differences in salt tolerance among varieties exist mainly in fruit trees, which are specifically sensitive to chloride and sodium salts. Differences among field and garden crops are not common and are usually small. Irrigation requirement: crop water

production functions relating yield to evapotranspiration are not influenced by water salinity. It is still controversial whether reduction in water uptake with increasing salinity is the cause or the result of reduction in growth. Leaching requirement: leaching is the key to the successful use of saline water for irrigation. Under normal field conditions with free drainage the leaching provided by the normal inefficiencies in irrigation should be sufficient to control salinity. When leaching is necessary, it should be provided at the time when the soil salinity reaches hazardous levels. Irrigation frequency: the bulk of the evidence shows no advantage to increasing irrigation frequency when saline water is used, except possibly under excessive leaching. Fertilizer application: the response to nitrogen and potassium fertilization under non-saline conditions is the same as or even greater than under saline conditions. Excessive phosphorous application may be toxic at high salinity, especially in hydroponic conditions. Availability of more than one water source: blending of saline with non-saline water is a questionable practice. It is preferable to use the non-saline water source early in the growing season and the source of saline water successively. Irrigation method: drip irrigation, where feasible, gives the greatest advantages when saline water is used. Sprinkler irrigation may cause leaf burn on sensitive crops. The damage may be reduced by night irrigation and by irrigating continually rather than intermittently. Drainage: the critical depth to the water table is determined mainly by the aeration requirement of the crop, as long as a net downward flux of water is maintained by natural or properly designed man made drainage system. The design drainage coefficient is determined by the leaching requirement. Soil hydraulic conductivity (K) and drainable porosity: important parameters in drainage design, are strongly influenced by the composition and concentration of the irrigation water. The higher the sodium adsorption ratio (SAR), the greater the reduction in K. The detrimental effect of high SAR is mitigated as the total salt concentration increases.


1715. **Using winter cover crops to improve soil and water quality.**
Dabney, S. M.; Delgado, J. A.; and Reeves, D. W.
*Communications in Soil Science and Plant Analysis* 32 (7/8): 1221-1250. (2001)
*NAL Call #:* S590.C63;
*ISSN:* 0010-3624 [CSOSA2].
*Notes:* Special issue: Potential use of innovative nutrient management alternatives to increase nutrient use efficiency, reduce losses, and protect soil and water quality/edited by J. Delgado. Proceedings of the Annual Conference of the Soil and Water Conservation Society held Aug. 8-11, 1999, Biloxi, Mississippi. Includes references.
*Descriptors:* cover crops/ secale cereale/ triticum aestivum/ winter/ erosion control/ water erosion/ nutrients/ losses from soil/ water quality/ pesticide residues/ water pollution/ pollution control/ soil fertility/ soil properties/ crop production/ daucus carota/ spinacia oleracea/ lactuca sativa/ solanum tuberosum/ literature reviews/ Colorado
*Abstract:* This article reviews literature about the impacts of cover crops in cropping systems that affect soil and water quality and presents limited new information to help fill knowledge gaps. Cover crops grow during periods when the soil might otherwise be fallow. While actively growing, cover crops increase solar energy harvest and carbon flux into the soil, providing food for soil macro and microorganisms, while simultaneously increasing evapotranspiration from the soil. Cover crops reduce sediment production from cropland by intercepting the kinetic energy of rainfall and by reducing the amount and velocity of runoff. Cover crops increase soil quality by improving biological, chemical and physical properties including: organic carbon content, cation exchange capacity, aggregate stability, and water infiltrability. Legume cover crops contribute a nitrogen (N) to subsequent crops. Other cover crops, especially grasses and brassicas, are better at scavenging residual N before it can leach. Because growth of these scavenging cover crops is usually N limited, growing grass/legume mixtures often increases total carbon inputs without sacrificing N scavenging efficiency. Cover crops are best adapted to warm areas with abundant precipitation. Water use by cover crops can adversely impact yields of subsequent dryland crops in semiarid areas. Similarly, cooler soil temperatures under cover crop residues can retard early growth of subsequent crops grown near the cold end of their range of adaptation. Development of systems that reduce the costs of cover crop establishment and overcome subsequent crop establishment problems will increase cover crop utilization and improve soil and water quality.
This citation is from AGRICOLA.

1716. **The utility of movement corridors in forested landscapes.**
Niemela, J.
*Scandinavian Journal of Forest Research* (suppl.3): 70-78. (2001)
*NAL Call #:* SD1.S34;
*ISSN:* 0282-7581.
*Notes:* Special issue: Science and the management of boreal forest biodiversity / edited by S. Larsson and K. Danell. Paper presented at a workshop held September 27-30, 1999, Olofsfors, Sweden. Includes references.
*Descriptors:* forests/ landscape/ habitats/ survival/ populations/ persistence/ forest management/ nature reserves/ fragmentation/ literature reviews
This citation is from AGRICOLA.

1717. **Utilization of resistant cultivars as components of Integrated Crop Protection.**
Hartleb, H.; Heitefuss, R.; and Hoppe, H. H.
In: Resistance of crop plants against fungi/ Hartleb, H.; Heitefuss, R.; and Hoppe, H. H.
Jena, Germany: G. Fischer, 1997; pp. 449-469.
*ISBN:* 3437353381
*NAL Call #:* SB750.R47-1997
*Descriptors:* plant disease control/ disease resistance/ cultivars/ genetic resistance/ pest management/ decision making/ fungicides/ leaves/ crop yield/ susceptibility/ split dressings/ application date/ virulence/ literature reviews
This citation is from AGRICOLA.

1718. **The value of buffer zones for the conservation of biodiversity.**
Boatman, N. D.
In: Brighton Crop Protection Conference: Pests & Diseases, 1998: Proceedings of an International Conference. (Held 16 Nov 1998-19 Nov 1998 at Brighton, UK.); Vol. 3.

Farnham, UK: British Crop Protection Council; pp. 939-950; 1998.
*ISBN:* 0-901396-52-5
This citation is provided courtesy of CAB International/CABI Publishing.

1719. **Variable-source-area controls on phosphorus transport: Bridging the gap between research and design.**
Gburek, W. J.; Drungil, C. C.; Srinivasan, M. S.; Needleman, B. A.; and Woodward, D. E.
*Journal of Soil and Water Conservation* 5 (6): 534-543. (Nov. 2002-Dec. 2002)
*NAL Call #:* 56.8 J822;
*ISSN:* 0022-4561 [JSWCA3]
*Descriptors:* phosphorus/ losses from soil/ indexes/ watersheds / transport processes/ runoff/ runoff water/ water erosion/ universal soil loss equation/ fields/ agricultural soils/ rain/ hydrology/ soil fertility/ Pennsylvania
This citation is from AGRICOLA.

1720. **Vegetated Stream Riparian Zones: Their Effects on Stream Nutrients, Sediments, and Toxic Substances.**
Correll, D.
Smithsonian Environmental Research Center, 1999.
*Notes:* 8th edition (text/html)
http://www.serc.si.edu/SERC_web_html/pub_ripzone.htm
*Descriptors:* riparian areas/ water quality/ information sources/ conservation buffers/ filter strips/ floodplains/ vegetation/ ground cover plants/ herbaceous plants/ riparian forests/ grasses/ hydrologic factors/ geomorphology/ water quality criteria/ trace elements / heavy metals/ nitrogen/ nitrites/ nitrates/ ammonia/ phosphorus/ herbicides/ salts/ organic matter/ total suspended solids/ denitrification/ evapotranspiration/ nitrification/ infiltration (hydrology)/ soil water movement/ sediment deposition/ biogeochemical cycles/ TSS
*Abstract:* SERC produced this annotated and indexed bibliography of the world's literature on buffer strips and their interactions with hyporheic zones and floodplains.

1721. **Vegetation-based indicators of wetland nutrient enrichment.**
Craft, C.; United States. Environmental Protection Agency. Health and Ecological Criteria Division; United States. Environmental Protection Agency. Wetlands Division; and United States. Environmental Protection Agency. Office of Water.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2003.
*Notes:* [Methods for evaluating wetland condition #16] Title from web page. "March 2002." Prepared jointly by: the U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetland Division (Office of Wetlands, Oceans, and Watersheds). "EPA-822-R-02-024." Includes bibliographical references.
*NAL Call #:* QH76.5.N8-V47-2002
http://www.epa.gov/waterscience/criteria/wetlands/16Indicators.pdf
*Descriptors:* wetlands / ecology/ land use/ nutrient enrichment/ nutrient enrichment/ vegetation/ environmental management

1722. **Vegetation corridors: A literature review with comments from a Swedish forest perspective.**
Nohlgren, Eva. and Gustafsson, Lena. Uppla, Sweden: SkogForsk; 40 p.: ill. (1995)
*Notes:* Includes bibliographical references (p. 34-38).
*NAL Call #:* SD211.R47--1995-no.1
This citation is from AGRICOLA.

1723. **Vegetation dynamics on rangelands: A critique of the current paradigms.**
Briske, D D; Fuhlendorf, S D; and Smeins, F E
*Journal of Applied Ecology* 40 (4): 601-614. (2003)
*NAL Call #:* 410 J828;
*ISSN:* 0021-8901
*Descriptors:* ecological thresholds/ equilibrium systems/ methodology/ non equilibrium systems/ paradigm shifts/ range condition/ rangeland ecology/ spatial scales/ temporal scales/ vegetation dynamics: event driven
*Abstract:* 1. Rangeland ecologists have been debating the validity of two current paradigms for the evaluation of vegetation dynamics on rangelands. This debate frequently contrasts the conventional model of continuous and reversible vegetation dynamics (range model) with a more contemporary model that can accommodate discontinuous and non-reversible vegetation change (state-and-transition model). 2. The range and the state-and-transition models are conceptually related to the equilibrium and non-equilibrium paradigms within ecology, respectively. The methodological dichotomy that has developed between the range and the state-and-transition models has fostered the perception that these two ecological paradigms are mutually exclusive. We challenge this perception and contend that both methodologies and their corresponding paradigms are non-exclusive. 3. Equilibrium and non-equilibrium ecosystems are not distinguished on the basis of unique processes or functions, but rather by the evaluation of system dynamics at various temporal and spatial scales. Consequently, ecosystems may express both equilibrium and non-equilibrium dynamics. This confirms early interpretations that ecosystems are distributed along a continuum from equilibrium to non-equilibrium states. 4. Although both equilibrium and non-equilibrium dynamics occur in numerous ecosystems, the empirical evidence is frequently confounded by (i) uncertainty regarding the appropriate evidence necessary to distinguish between paradigms; (ii) disproportionate responses among vegetation attributes to climate and grazing; (iii) comparisons among systems with varying degrees of managerial involvement; and (iv) the evaluation of vegetation dynamics at various spatial and temporal scales. 5. Synthesis and applications. This critique supports the conclusion that a paradigm shift has not taken place in rangeland ecology, but rather, the debate has forced a more comprehensive interpretation of vegetation dynamics along the entirety of the equilibrium-non-equilibrium continuum. Therefore, the rangeland debate should be redirected from the dichotomy between paradigms to one of paradigm integration.


1724. **Vegetation growth in rivers: Influences upon sediment and nutrient dynamics.**
Clarke, S. J.
*Progress in Physical Geography* 26 (2): 159-172. (2002);
*ISSN:* 0309-1333
*Descriptors:* Vegetation cover/ Bottom topography/ Hydrology/ Hydrodynamics/ Nutrient cycles/ Sediment dynamics/ Rivers/

Vegetation/ Sediments/ Nutrients/ Geomorphology/ Fluvial Sediments/ River Flow/ Dynamics of lakes and rivers/ Water and plants
*Abstract:* Hydrological and geomorphological research in river environments has largely ignored the influence of instream vegetation growth; focusing rather on the role of riparian vegetation as a control on bank stability or as a potential buffer for dissolved and particulate material entering the channel from the hillslope. However, in many lowland streams instream vegetation may be abundant and reach high levels of biomass during the growing season. These instream plants (macrophytes) have a significant effect on flow, sediment and nutrient dynamics. Plant growth may cause increased frictional resistance to flow and through flow diversion may have a short- to medium-term influence on instream channel geomorphology. Additionally, this effect of plants upon flow velocities within the channel has an impact on sedimentation patterns. Rooted plants also function as a link between bed sediments and the water column, thus plants have a key role in the cycling of nutrients between these two components of the fluvial system. This, combined with the uptake and temporary storage of nutrients by the plants and the retention of fine sediments within dense plant stands, has the result that plants within rivers are an integral component of nutrient dynamics. A review of research on the role of macrophytes in fluvial system nutrient dynamics is presented and identifies the need for an increased understanding and recognition of the role of plants in the functioning of fluvial systems as a whole.


1725. **Vegetation management and ecosystem disturbance: Impact of glyphosate herbicide on plant and animal diversity in terrestrial systems.**
Sullivan, Thomas P and Sullivan, Druscllia S
*Environmental Reviews* 11 (1): 37-59. (2003)
*NAL Call #:* GE140.E59;
*ISSN:* 1181-8700
*Descriptors:* glyphosate herbicide: pesticide, soil pollutant, toxin/ Alces alces [moose] (Cervidae): bioindicator/ Capreolus capreolus (Cervidae): bioindicator, deer/ Lepus spp. [hare] (Leporidae): bioindicator/ Odocoileus spp. (Cervidae): bioindicator, deer/ plant (Plantae): bioindicator/ Animals/ Artiodactyls/ Chordates/ Lagomorphs/ Mammals / Nonhuman Mammals/ Nonhuman Vertebrates/ Plants/ Vertebrates/ agro ecosystem/ biodiversity/ crop production/ forest ecosystem/ species richness/ temperate climate/ terrestrial ecosystem/ vegetation management/ weed control


1726. **Vegetation management for the maintenance and conservation of butterfly habitats in temperate human-dominated landscapes.**
Smallidge, P. J. and Leopold, D. J.
*Landscape and Urban Planning* 38 (3-4): 259-280. (1997)
*NAL Call #:* QH75.A1L32;
*ISSN:* 0169-2046.
*Notes:* Special issue: Wildlife habitats in human dominated landscapes
*Descriptors:* habitat/ environment management/ conservation/ vegetation/ Ecosystem management/ Natural disturbance/ Ecosystem disturbance/ Land use/ Fragmentation/ Lepidoptera/ Papilionoidea/ Lepidoptera/ Butterflies/ Management/ Human Population Biosphere Interactions/ Populations & general ecology
*Abstract:* Many temperate butterfly species occur in habitats where human activities have altered the natural or long-term disturbance regime, and current activities modify the structure and availability of butterfly habitats over several spatial and temporal scales. Indeed, human activities modify key ecological processes sufficiently that the maintenance of some butterfly populations depends on human intervention to provide suitable habitat. Combined changes in historic and current disturbance regimes and human land-use practices necessitate active vegetation and habitat management to conserve and expand many butterfly populations. Efforts to protect temperate butterfly habitats often have resulted in successional changes that reduce habitat suitability. Butterfly habitats commonly deteriorate through a reduced intensity and frequency of long-term disturbance or management patterns that result in smaller and fragmented patches of early successional habitat. Fragmentation of otherwise continuous habitats can result in the forced dependence of a metapopulation structure. Because some butterfly larvae require one or a few host plants or adults are selective for nectar or oviposition sites, habitat management plans that include selection of an appropriate site for subsequent vegetation management activities may enhance conservation efforts. Vegetation management activities within an area can be coordinated to provide a mosaic landscape with habitats suitable for numerous species. Recommended vegetation management strategies vary with plant community type, historic disturbance regime, desired vegetation structure and composition, spatial pattern of habitat patches, land ownership patterns, and economic constraints. Because butterflies respond directly and indirectly to vegetation management and to the mosaic nature of habitat patches within the landscape, management plans must accommodate the constraints of the regional landscape and the spatial and temporal dynamics of the prescribed disturbance or management regime. We review efforts to manage temperate plant communities for butterfly habitat, and discuss general strategies for developing a vegetation management program for butterfly habitats in human-dominated landscapes. A case study of Karner blue butterfly habitat conservation efforts is provided.


1727. **Viewpoint: Benefits and impacts of wildlife water developments.**
Rosenstock, S. S.; Ballard, W. B.; and DeVos, J. C. Jr.
*Journal of Range Management* 52 (4): 302-311. (July 1999)
*NAL Call #:* 60.18-J82;
*ISSN:* 0022-409X [JRMGAQ]
*Descriptors:* game birds/ water resources/ arid lands/ predators/ wildlife management/ ovis canadensis/ odocoileus virginianus/ odocoileus hemionus/ chiroptera/ antilocapra americana/ wild birds/ desert rodents/ lagomorpha/ adverse effects/ reptiles/ water quality/ cost benefit analysis/ duration/ experimental design/ literature reviews/ callipepla/ zenaida
*Abstract:* Resource managers in the western United States have long assumed that water was a key limiting

factor on wildlife populations in arid habitats. Beginning in the 1940s-1950s, state and federal resource management agencies initiated water development programs intended to benefit game species and other wildlife. At least 5,859 such developments have been built in 11 western states. Most state wildlife management agencies in the western United States have ongoing wildlife water development programs that vary greatly in extent. Ranchers and range managers also have developed water sources for livestock, many of which also are used by wildlife. Recently, critics have suggested that wildlife water developments have not yielded expected benefits, and may negatively impact wildlife by increasing predation, competition, and disease transmission. Based upon a comprehensive review of scientific literature, we conclude that wildlife water developments have likely benefitted many game and non-game species, but not all water development projects have yielded expected increases in animal distribution and abundance. Hypothesized negative impacts of water developments on wildlife are not supported by data and remain largely speculative. However, our understanding of both positive and negative effects of wildlife water developments is incomplete, because of design limitations of previous research. Long-term, experimental studies are needed to address unanswered questions concerning the efficacy and ecological effects of water developments. We also recommend that resource managers apply more rigorous planning criteria to new developments, and expand monitoring efforts associated with water development programs.
This citation is from AGRICOLA.

1728. **Volatile fatty acids as odor indicators of swine manure: A critical review.**
Zhu, J.; Riskowski, G. L.; and Torremorell, M.
*Transactions of the ASAE* 42 (1): 175-182. (1999)
*NAL Call #:* 290.9-Am32T;
*ISSN:* 0001-2351 [TAAEAJ]
*Descriptors:* pig manure/ volatile fatty acids/ odors/ indicators/ bacteria/ odor abatement/ catabolism
*Abstract:* Determination of odor indicators in swine manure is critical for many aspects of developing effective odor control techniques. Past research has used volatile fatty acids (VFAs) as an odor indicator; however, using all VFAs can still be misleading. This article presents the available information regarding the mechanisms in microbiology and biochemistry of producing volatile fatty acids in swine manure and an extensive discussion on using VFAs as odor indicators. Long chain and branching VFAs (C4-C9) may represent the offensiveness of malodors in swine manure better than short and straight chain acids and thus should receive further research to correlate them with odor indicators. Two bacterial genera, Eubacterium and Clostridium, appear to be the most likely major contributors to the production of odorous compounds, such as volatile fatty acids, in swine manure. More research is needed to identify the species within these two genera to determine the types and quantities of odorous compounds produced by different species.
This citation is from AGRICOLA.

1729. **A VSA-based strategy for placing conservation buffers in agricultural watersheds.**
Qiu, Z. Y.
*Environmental Management* 32 (3): 299-311. (2003)
*NAL Call #:* HC79.E5E5;
*ISSN:* 0364-152X.
*Notes:* Number of References: 80; Publisher: Springer-Verlag
*Descriptors:* Environment/ Ecology/ conservation buffers/ water quality/ landscape planning/ benefit cost analysis/ variable source areas/ source area hydrology/ filter strips/ forested catchments/ runoff generation/ pollution control/ topmodel/ model/ soil/ quality/ drainage
*Abstract:* Conservation buffers have the potential to reduce agricultural nonpoint source pollution and improve terrestrial wildlife habitat, landscape biodiversity, flood control, recreation, and aesthetics. Conservation buffers, streamside areas and riparian wetlands are being used or have been proposed to control agricultural nonpoint source pollution. This paper proposes an innovative strategy for placing conservation buffers based on the variable source area (VSA) hydrology. VSAs are small, variable but predictable portion of a watershed that regularly contributes to runoff generation. The VSA-based strategy involves the following three steps: first, identifying VSAs in landscapes based on natural characteristics such as hydrology, land use/cover, topography and soils; second, targeting areas within VSAs for conservation buffers; third, refining the size and location of conservation buffers based on other factors such as weather, environmental objectives, available funding and other best management practices. Building conservation buffers in VSAs allows agricultural runoff to more uniformly enter buffers and stay there longer, which increases the buffer's capacity to remove sediments and nutrients. A field-scale example is presented to demonstrate the effectiveness and cost-effectiveness of the within-VSA conservation buffer scenario relative to a typical edge-of-field buffer scenario. The results enhance the understanding of hydrological processes and interactions between agricultural lands and conservation buffers in agricultural landscapes, and provide practical guidance for land resource managers and conservationists who use conservation buffers to improve water quality and amenity values of agricultural landscape.


1730. **Waste management and utilization in food production and processing.**
Boersma, L. L. and Murarka, I. P.
Ames, IA: Council for Agricultural Science and Technology; Task force report no. 124, 1995. 125 p.
*ISBN:* 1887383026
*Descriptors:* waste management/ crop production/ livestock production/ fertilizer application/ crop residues/ recycling/ food processing
This citation is from AGRICOLA.

1731. **Waste management for hog farms: Review.**
Svoboda IF and Jones A
*Asian Australasian Journal of Animal Sciences* 12 (2): 295-304; 32 ref. (1999)
*NAL Call #:* SF55.A78A7

1732. **Water analysis: Emerging contaminants and current issues.**
Richardson, S. D.
*Analytical Chemistry (Washington)* 75 (12): 2831-2857. (2003);
*ISSN:* 0003-2700
This citation is provided courtesy of CAB International/CABI Publishing.

1733. **Water and nutrient management for greenhouses.**
Cornell Controlled Environment Agriculture Working Group.; Sailus, Martin.; and Weiler, Thomas C.
Ithaca, N.Y.: Northeast Regional Agricultural Engineering Service; 102 p.: ill.; Series: NRAES 56. (1996)
*Notes:* Includes bibliographical references (p. 100-102).
*NAL Call #:* S675.C67--1996
*Descriptors:* Greenhouse plants--- Irrigation
*Abstract:* Preparing stock solutions for proportioners; selecting substrate; interpreting leaf, substrate, and water test results; and estimating crop nutrient needs are necessary skills for managing a greenhouse for zero runoff. This publication will help greenhouse managers learn these skills. The book begins with discussions on general crop needs, balancing nutrient applications with crop demand, and the units used in measuring fertilizer quantities. Subsequent chapters go into more detail about specific components of the root zone: water, fertilizer, substrate, temperature, and the biotic environment. How to use a fertilizer proportioner and the features of a well-designed water and nutrient delivery system are discussed as well.
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1734. **Water Conservation, Competition and Quality in Western Irrigated Agriculture: An Overview of the W-190 Regional Research Project, 1994-99.**
Gopalakrishnan, C.
*International Journal of Water Resources Development* 16 (2): 177-185. (2000)
*NAL Call #:* TD201.I56;
*ISSN:* 0790-0627.
*Notes:* Special issue: Water and agriculture in the American West; DOI: 10.1080/07900620050003099
*Descriptors:* Water Conservation/ Irrigation Water/ Agriculture/ Water Supply/ Water Demand/ Water Allocation/ Research Priorities/ Water Resources Management/ United States/ Water supplies/ Water demand/ Water management/ Conservation in agricultural use/ Underground Services and Water Use
*Abstract:* Irrigated agriculture in the American West has experienced a variety of problems in respect of the supply, demand, allocation and management of water. In an effort to address some of these issues, a regional research project (W-190) entitled `Water Conservation, Competition and Quality in Western Irrigated Agriculture' was set up in 1994, initially for a five-year period. The papers published in this special issue of IJWRD are the upshot of research conducted to meet the three specific objectives of this project. This paper presents an overview and assessment of research carried out under this project, by objective and by state, during its first five-year period.
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1735. **The Water Hyacinth: An Environmental Friend or Pest? A Review.**
Mehra, A.; Farago, M. E.; Banerjee, D. K.; and Cordes, K. B.
*Resource and Environmental Biotechnology* 4: 255-281. (1999);
*ISSN:* 1358-2283
*Descriptors:* Water Hyacinth/ Survival/ Stress/ Water Temperature/ Organic Compounds/ Industrial Wastewater/ Wastewater Treatment/ Reviews/ Planting Management/ Literature reviews/ Freshwater weeds/ Ecosystem management/ Bioaccumulation/ Plant control/ Water pollution treatment/ Biotechnology/ Aquatic plants/ Phytoremediation/ Animal feeds/ Fertilizers/ Biogas/ Evapotranspiration/ Freshwater pollution/ Pest control/ Eichhornia crassipes/ Hydrilla verticillata/ Wastewater treatment processes/ Mechanical and natural changes/ Environmental action/ Control of water on the surface
*Abstract:* The water hyacinth, a potential environmental resource and also a persistent pest, is reviewed in terms of both its usefulness to clean wastewaters and its detrimental effects on water bodies which need proper management and control. Although there is considerable literature on the bioaccumulation capacity of the plant and its potential for metal removal from wastewaters, its use for the removal of organic contaminants from industrial wastewaters has not received much attention. The ability of the water hyacinth to survive under stress and wide ranging temperature, pH and saline conditions enhances its ability for treating wastewaters. Moreover, the plant can be utilized for animal feed, biofertilizer production, biogas production, paper manufacture and also for integrated rural development. The detrimental effects of the water hyacinth are strongly linked with its capacity to multiply and spread very rapidly as a weed and thus cause problems for navigation in waterways, increase flooding, block water intakes to hydropower plants and irrigation channels, decrease the amount of fresh water in water bodies by evapotranspiration, damage fish habitats and reduce fishing opportunities, and increase sedimentation of lakes and reservoirs. The plant needs to be properly managed by means of physical, biological and chemical control methods to prevent further serious problems.
© Cambridge Scientific Abstracts (CSA)

1736. **Water in food production and processing: Quantity and quality concerns.**
Kirby, R. M.; Bartram, J.; and Carr, R.
*Food Control* 14 (5): 283-299. (2003);
*ISSN:* 0956-7135
This citation is provided courtesy of CAB International/CABI Publishing.

1737. **Water in pig nutrition: Physiology, allowances and environmental implications.**
Mroz, Z.; Jongbloed, A. W.; Lenis, N. P.; and Vreman, K.
*Nutrition Research Reviews* 8: 137-164. (1995)
*NAL Call #:* QP141.A1N87;
*ISSN:* 0954-4224 [NREREX]
*Descriptors:* pigs/ nutritional state/ body water/ water metabolism/ drinking water/ water intake/ water excretion / urine/ feces/ animal physiology/ environmental factors/ diet/ body weight/ nutrient requirements/ circadian rhythm/ piglets/ growth period/ sow pregnancy/ sow lactation/ blood/ manures/ sodium chloride/ literature reviews
This citation is from AGRICOLA.

1738. **Water in the West: The challenge for the next century: Report of the Western Water Policy Review Advisory Commission.**
United States. Western Water Policy Review Advisory Commission.
Denver, Colo.: Western Water Policy Review Advisory Commission; 1 v. (various pagings): ill., maps (some col.). (1998)
*Notes:* Final report; "June 1998." Shipping list no.: 99-0021-P. Includes bibliographical references.
*NAL Call #:* HD1695.A17-U54-1998
*Descriptors:* Water resources development---Government policy---West U.S./ Water---Law and legislation---West U.S./ Water supply---Government policy---West U.S./ Watershed management---Government policy---West U.S./ Water rights---West U.S.
This citation is from AGRICOLA.

1739. **Water management strategies for salinity control.**
Van Schilfgaarde, J.
*Tasks for Vegetation Science* (28): 371-377. (1993)
*NAL Call #:* QK1.T37;
*ISSN:* 0167-9406.
*Notes:* In the series analytic: Towards the rational use of high salinity tolerant plants. 2. Agriculture and forestry under marginal soil water conditions / edited by H. Lieth and A.A. Al Masoom. Proceedings of the 1st ASWAS Conference held December 8-15, 1990, Al Ain, United Arab Emirates. Literature review. Includes references.
*Descriptors:* crop production/ irrigation/ irrigation water/ saline water/ brackish water/ salinity/ water management/ arid regions/ literature reviews/ irrigated farming
This citation is from AGRICOLA.

1740. **Water Quality and Agriculture: Status, Conditions, and Trends.**
Sutton, J. D. and U.S. Department of Agriculture, Natural Resources Conservation Service.
U. S. Department of Agriculture [Also available as: Working Paper #16], 1997 (application/pdf)
http://www.nrcs.usda.gov/technical/land/pubs/WP16.pdf
*Descriptors:* water quality/ water quality analysis/ water quality criteria/ soil quality/ soil erosion/ agrochemicals/ nutrient management/ nonpoint source pollution/ environmental monitoring/ agricultural policy/ governmental programs and projects
*Abstract:* National opinion surveys reflect the public's concern that sediment from agricultural land, pesticides, and fertilizers from animal wastes and chemical applications may be contributing to surface and ground water pollution. This publication documents the national and regional status of and trends in water quality from the early 1980s to the early 1990s relative to these agricultural substances. It sets the stage for subsequent analysis of projected resource conditions under alternative social, economic, and environmental policies.

1741. **Water quality and poultry production.**
King, A. J.
*Poultry Science* 75 (7): 852-853. (1996);
*ISSN:* 0032-5791
This citation is provided courtesy of CAB International/CABI Publishing.

1742. **Water-quality assessment of part of the upper Mississippi River Basin, Minnesota and Wisconsin: Review of selected literature.**
Andrews, William J. and Geological Survey (U.S.).
Mounds View, Minn.: U.S. Dept. of the Interior, U.S. Geological Survey; vi, 21 p.: col. maps; Series: Water-resources investigations report 96-4149. (1996)
*Notes:* "Contribution from the National Water-Quality Assessment Program." "National Water-Quality Assessment study unit"--Cover. Shipping list no.: 97-0017-P. Includes bibliographical references (p. 10-21). SUDOCS: I 19.42/4:96-4149.
*NAL Call #:* GB701.W375--no.96-4149
*Descriptors:* Water quality---Mississippi River---Watershed/ Water quality management---Mississippi River---Watershed/ Groundwater---Mississippi River---Watershed---Quality
This citation is from AGRICOLA.

1743. **Water quality effect of rangeland beef cattle excrement.**
Nader, G.; Tate, K. W.; Atwill, R.; and Bushnell, J.
*Rangelands* 20 (5): 19-25. (1998)
*NAL Call #:* SF85.A1R32;
*ISSN:* 0190-0528
This citation is provided courtesy of CAB International/CABI Publishing.

1744. **Water quality for irrigation and human consumption: A literature review and results from a case study in Eritrea: A minor field study.**
Fox, Patrick.
Uppsala: Swedish University of Agricultural Sciences, International Rural Development Centre; 80, 12, 5 p.: ill., maps; Series: Working paper (Sveriges lantbruksuniversitet. International Rural Development Centre) 252. (1994)
*Notes:* Includes bibliographical references (p. 77-79).
*NAL Call #:* HD1401.W675--no.252
This citation is from AGRICOLA.

1745. **Water quality functions of riparian forest buffer systems in the Chesapeake Bay Watershed: A report of the Nutrient Subcommittee of the Chesapeake Bay Program.**
Lowrance, R.; Altier, L. S.; Newbold, J. D.; Schnabel, R. R.; Groffman, P. M.; Denver, J. M.; Correll, D. L.; Gilliam, J. W.; Robinson, J. L.; Brinsfield, R. B.; Staver, K. W.; Lucas, W.; and Todd, A. H.
Annapolis, MD: U.S. Environmental Protection Agency for the Chesapeake Bay Program EPA 903-R-95-004; 67 p. (1995)
*NAL Call #:* TD225.C43W383 1995
http://www.epa.gov/cgi-bin/claritgw?op-Display&document=clserv:Other:0836;&rank=4&template=epa
*Descriptors:* Water quality management---Chesapeake Bay Watershed---Md and Va/ Riparian forests---Chesapeake Bay Watershed---Md and Va/ Chesapeake Bay Watershed/ Nonpoint source pollution---Chesapeake Bay Watershed---Md and Va
This citation is from AGRICOLA.

1746. **Water quality impacts of forest fertilization with nitrogen and phosphorus.**
Binkley, Dan; Burnham, Heather; and Allen, H Lee
*Forest Ecology and Management* 121 (3): 191-213. (1999)
*NAL Call #:* SD1.F73;
*ISSN:* 0378-1127
*Descriptors:* nitrate: pollutant/ nitrogen: fertilizer/ phosphorus: fertilizer/ streamwater quality
*Abstract:* The drinking-water quality of streamwater in forests is typically very good, exceeding the quality of

water in areas with other types of land use. Streams draining agricultural lands in the United States average about nine times greater concentrations of nitrate and phosphate than streams draining forested areas. Forest fertilization commonly increases nutrient concentrations in streamwater, and large increases could lead to unacceptable degradation of water quality. This review summarizes information from studies of forest fertilization around the world, and evaluates the responses of streamwater chemistry. In general, peak concentrations of nitrate-N in streamwater increase after forest fertilization, with a few studies reporting concentrations as high as 10-25 (mg N)/l as nitrate. Increases in average concentrations of nitrate are much lower than the peak values, and the highest annual average nitrate-N concentration ever reported was 4 (mg N)/l. Relatively high concentrations of streamwater nitrate-N tend to occur with repeated fertilization, use of ammonium nitrate (rather than urea), and fertilization of N-saturated hardwood forests. Ammonium-N concentrations may also show large peaks following fertilization (up to 15 (mg N)/l), but annual averages remain <0.5 (mg N)/l. Fertilization with phosphate can lead to increased peak concentrations of >1 (mg P)/l, but annual averages remain <0.25 (mg P)/l. No evidence has been reported of detectable effects of forest fertilization on the composition or productivity of stream communities, but more detailed studies may be warranted (especially in relation to P fertilization). Major limitations in current knowledge include the effects of repeated fertilization in short-rotation plantations, fertilization of large landscapes rather than small stands, and the effects of fertilization on streamwater chemistry in tropical plantations.


1747. **Water reclamation and reuse.**
Smith, R. G.
*Water Environment Research* 65 (4): 371-374. (June 1993)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303.
*Notes:* Literature review. Includes references.
*Descriptors:* water pollution/ water purification/ waste water treatment/ water reuse/ irrigation water/ United States/ U.S. Environmental Protection Agency (EPA)
This citation is from AGRICOLA.

1748. **Water reclamation and reuse.**
Smith, R. G. and Walker, M. R.
*Water Environment Research* 66 (4): 378-383. (June 1994)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303 [WAERED]
*Descriptors:* water/ reclamation/ water reuse/ planning/ management/ irrigation water/ drainage water/ literature reviews
This citation is from AGRICOLA.

1749. **Water reclamation and reuse.**
Smith, R. G.
*Water Environment Research* 67 (4): 488-495. (June 1995)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303 [WAERED]
*Descriptors:* water reuse/ groundwater recharge/ water resources/ waste water/ irrigation/ irrigation water/ literature reviews/ water recycling
This citation is from AGRICOLA.

1750. **Water reclamation and reuse.**
Van Riper, C. and Geselbracht, J.
*Water Environment Research* 68 (4): 516-520. (1996)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303 [WAERED]
*Descriptors:* water reuse/ water purification/ reclamation/ irrigation water/ waste water/ literature reviews/ reclaimed water
This citation is from AGRICOLA.

1751. **Water reclamation and reuse.**
Van Riper, C. and Geselbracht, J.
*Water Environment Research* 70 (4): 586-590. (June 1998)
*NAL Call #:* TD419.R47;
*ISSN:* 1061-4303 [WAERED]
*Descriptors:* water purification/ water reuse/ waste water/ waste water treatment/ groundwater recharge/ literature reviews/ irrigation water
This citation is from AGRICOLA.

1752. **Water relations of riparian plants from warm desert regions.**
Smith, S. D.; Devitt, D. A.; Sala, A.; Cleverly, J. R.; and Busch, D. E.
*Wetlands* 18 (4): 687-696. (1998)
*NAL Call #:* QH75.A1W47;
*ISSN:* 0277-5212
This citation is provided courtesy of CAB International/CABI Publishing.

1753. **Water Repellency in Soils: A Historical Overview.**
Debano, L. F.
*Journal of Hydrology* 231-232 (1-4): 4-32. (2000)
*NAL Call #:* 292.8 J82;
*ISSN:* 0022-1694.
*Notes:* Special issue: Water repellency in soils
*Descriptors:* Water Repellent Soils/ Soil Absorption Capacity/ Soil Properties/ Soil Types/ Water Harvesting / Productivity/ Ecosystems/ Water in soils
*Abstract:* The purpose of this paper is to document some of the more important highlights of the research and historical aspects concerning soil water-repellency. This effort traces the evolution of interests and concerns in water repellency from basic studies in the nineteenth century to the earlier part of the 20th century and up to our current-day understanding of this subject. The interactions among different scientific disciplines, various manager-scientists efforts, and specific scientific and management concerns are presented chronologically. This growing interest in water repellency generated an earlier conference in 1968 which was devoted exclusively to water repellency and has since initiated productive discussions and debate on water repellency during several peripherally related national and international conferences. The 1968 conference held in Riverside, California (USA), mainly involved scientists from the United States and Australia. Since this early conference, a large body of information has been published in a wide range of scientific disciplines throughout the world. This worldwide attention has produced many recent research findings, which have improved the understanding of water-repellent soils, particularly of the dynamics of the water movement and redistribution in these unique systems. Intermingled with the effort in water repellency is a related, although somewhat separate, body of information dealing with soil aggregation and water harvesting, which are important for improving the productivity of fragile and ecosystems. A summary is presented of the literature on water repellency, showing changes in subject areas and national interests over time.

1754. **Water resource investments in irrigated agriculture: A conservation basebook.**
Pavelis, George A.; Anwer, Muhammad Sarfraz.; Colorado State University. Dept. of Sociology. Water Laboratory; United States. Bureau of Reclamation; and United States. Natural Resources Conservation Service. Resource Economics and Social Sciences Division.
Fort Collins, Colo.: Dept. of Sociology Water Laboratory, Colorado State University; viii, 138 p.: col. ill., col. maps. (2002)
*Notes:* Interim report: Management practice study III: Social and economic sustainability of irrigated family farms in the West.; Research in collaboration with the U.S. Bureau of Reclamation, with support from the Resource Economics and Social Science Division of the Natural Resources Conservation Service, USDA. "December 2002." Includes bibliographical references (p. 106-107).
*NAL Call #:* TD388-.P38-2002
*Descriptors:* Water conservation---West---United States/ Irrigated farming---Economic aspects---West---United States
This citation is from AGRICOLA.

1755. **Water-sediment controversy in setting environmental standards for selenium.**
Hamilton, Steven J and Lemly, A Dennis
*Ecotoxicology and Environmental Safety* 44 (3): 227-235. (1999)
*NAL Call #:* QH545.A1E29;
*ISSN:* 0147-6513
*Descriptors:* selenium: environmental standards, national water quality criterion, pollutant/ environmental contamination
*Abstract:* A substantial amount of laboratory and field research on selenium effects to biota has been accomplished since the national water quality criterion was published for selenium in 1987. Many articles have documented adverse effects on biota at concentrations below the current chronic criterion of 5 mug/L. This commentary will present information to support a national water quality criterion for selenium of 2 mug/L, based on a wide array of support from federal, state, university, and international sources. Recently, two articles have argued for a sediment-based criterion and presented a model for deriving site-specific criteria. In one example, they calculate a criterion of 31 mug/L for a stream with a low sediment selenium toxicity threshold and low site-specific sediment total organic carbon content, which is substantially higher than the national criterion of 5 mug/L. Their basic premise for proposing a sediment-based method has been critically reviewed and problems in their approach are discussed.
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1756. **Water-use efficiency on irrigation systems: A review of research carried out under DFID's engineering research programme.**
Brown, D.
*Agricultural Water Management* 40 (1): 139-147. (Mar. 1999)
*NAL Call #:* S494.5.W3A3;
*ISSN:* 0378-3774 [AWMADF].
*Notes:* Annex 1; Special issue: More from less: Improving irrigation water-use efficiency / edited by W. Stephens, T. Hess, R.C. Carter and P. Howsam. Includes references.
*Descriptors:* water management/ water use efficiency/ irrigation systems/ research support/ research projects/ UK/ department for international development
This citation is from AGRICOLA.

1757. **Waterborne pathogens in agricultural watersheds.**
Rosen, B. H. and Croft, R.
Ithaca, NY: Natural Resource, Agriculture, and Engineering Service; 62 p. (2001); *ISBN:* 0935817689
*Descriptors:* pathogens/ agricultural watersheds/ monitoring/ Cryptosporidium parvum/ Giardia/ Escherichia coli O157:H7/ Campylobacter/ algal blooms / disease control
*Abstract:* This publication introduces waterborne pathogens, the disease-causing organisms that contaminate water. Key organisms of concern are described in detail, including Escherichia coli 0157:H7, Cryptosporidium parvum, and Giardia species. Indicator bacteria that are normally monitored for water quality are described as well. Waterborne Pathogens in Agricultural Watersheds represents a proactive approach for reducing overall pathogen loading within a watershed. The viability of organisms in an agricultural setting is discussed, along with relevant management practices for controlling waterborne pathogens at their source. Harmful algal blooms are also addressed, although these organisms do not fall neatly into the category of pathogen. While foodborne pathogens are not specifically described in this publication, the pathogens that are described may contaminate both food and water.
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1758. **Watershed abatement costs for agricultural phosphorus.**
Johansson, R. C. and Randall, J.
*Water Resources Research* 39 (4): NIL_9-NIL_16. (2003)
*NAL Call #:* 292.8 W295;
*ISSN:* 0043-1397
*Descriptors:* Environment/ Ecology/ Civil Engineering/ nonpoint source pollution/ phosphorus/ abatement cost/ pollution abatement/ management/ index/ scale
*Abstract:* [1] Agricultural, nonpoint pollution has increasingly become the focus of state and federal water quality mitigation efforts. However, this pollution is spatially dispersed and temporally uncertain, making regulatory efforts aimed at its abatement difficult. For these reasons, policymakers have concentrated on reducing the potential of agricultural, nonpoint sources to emit pollutants. Because the majority of the nonpoint pollution originates from a minority of U. S. cropland, these efforts have often been targeted using indices, such as the phosphorus index. This paper develops the concept of a phosphorus index to explicitly include heterogeneous productivity, which is necessary to efficiently target nonpoint pollution efforts. Such targeting can improve cost effectiveness and increase the scope of voluntary conservation programs designed to mitigate agricultural phosphorus pollution.
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1759. **Watershed-based management strategies for the prevention and abatement of polluted agricultural runoff.**
Frarey, L. C. and Jones, H. H.
*Environmental Monitoring and Assessment* 41 (2): 109-124. (June 1996)
*NAL Call #:* TD194.E5;
*ISSN:* 0167-6369 [EMASDH].
*Notes:* Special issue: Environmental quality in watersheds / edited by V.G.G. Mennella and L.C. Frarey. Includes references.

*Descriptors:* livestock farming/ livestock feeding/ runoff/ water pollution/ pollution control/ watersheds/ watershed management/ agricultural land/ environmental impact/ environmental legislation/ federal government/ state government/ Texas/ Arkansas/ United States/ point source pollution/ concentrated animal feeding operations/ Clean Water Act of 1972/ U.S. Environmental Protection Agency (EPA)/ Texas Institute for Applied Environmental Research
This citation is from AGRICOLA.

1760. **Watershed effects of biosolids land application: Literature review.**
Draeger, Kathryn J.
Alexandria, VA: Water Environment Research Foundation; 1 v. (various pagings): ill., maps. (1999)
*Notes:* "Project 96-REM-2." "Final report"--Cover. Includes bibliographical references.
*NAL Call #:* TD774-.W38-1999;
*ISBN:* 1893664007
*Descriptors:* Land treatment of wastewater/ Sewage sludge as fertilizer/ Sewage disposal in the ground / Watershed management
This citation is from AGRICOLA.

1761. **Watershed level risk assessment of nitrogen and phosphorus export.**
Wickham, James D and
Wade, Timothy G
*Computers and Electronics in Agriculture* 37 (1-3): 15-24. (2002)
*NAL Call #:* S494.5.D3C652;
*ISSN:* 0168-1699
*Descriptors:* nitrogen: environmental impact, export, nutrient, pollutant, water pollutant/ phosphorus: environmental impact, export, nutrient, pollutant, water pollutant/ land mass cover
*Abstract:* Land cover composition across a watershed is a principal factor in controlling the amount of nitrogen and phosphorus exported from a watershed. A well developed literature of nutrient export coefficients by land-cover class was used to model the risk of equaling or exceeding specified levels of nutrient export. The model was applied to about 1000 comparatively small watersheds mapped for the state of Maryland for environmental analysis and planning. Risk estimates generally increased from west to east, but numerous areas of high variability were evident. Risk of exceeding specified levels of nitrogen and phosphorus export were nonlinearly related to the amount of forest in the watershed. Risk increased more dramatically for phosphorus and nitrogen when forest dropped below between 90 and 95%, respectively. Bifurcations in this nonlinear relationship were the result of the relative abundance of agriculture and urban land in the watershed. The nonlinear relationship between percentage forest and risk increased more dramatically for phosphorus and less dramatically for nitrogen when urban was relatively more abundant than agriculture. Regional-scale variation in risk is discussed in terms of its relevance to environmental management.


1762. **Watershed management contributions to land stewardship: A literature review.**
Baker, Malchus B. and Rocky Mountain Research Station
Fort Collins, CO: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station; Series: General technical report RMRS GTR-71-WWW. (2000)
*Notes:* Title from title screen. "December 2000." Includes bibliographical references.
*NAL Call #:* aSD144.A14-G46-no.-71
http://www.fs.fed.us/rm/pubs/rmrs_gtr71.pdf
*Descriptors:* Watershed management---Bibliography
This citation is from AGRICOLA.

1763. **Watershed management for potable water supply: Assessing the New York City strategy.**
National Research Council (U.S.). Committee to Review the New York City Watershed Management Strategy.
Washington, D.C.: National Academy Press; xiii, 549 p.: ill. (2000)
*NAL Call #:* TD225.N5-W38-2000;
*ISBN:* 0309067774
http://www.nap.edu/books/0309067774/html/
*Descriptors:* Water quality management---New York, NY/ Watershed management---New York, NY/ Drinking water---New York, NY/ Water supply---New York, NY/ Phosphorus---Environmental aspects---New York NY
This citation is from AGRICOLA.

1764. **Watershed-scale hydrologic and nonpoint-source pollution models: Review of mathematical bases.**
Borah, D. K. and Bera, M.
*Transactions of the ASAE* 46 (6): 1553-1566. (2003)
*NAL Call #:* 290.9 Am32T;
*ISSN:* 0001-2351.
*Notes:* Number of References: 87
*Descriptors:* Agriculture/ Agronomy/ agriculture/ agrochemical/ hydrology/ modeling/ nonpoint source pollution / sediment/ water quality/ watershed/ sediment/ runoff/ transport/ Illinois/ nitrate/ system/ AGNPS model/ flood/ SHE model/ ANSWERS model/ CASC2D model/ DWSM (model)/ KINEROS model/ PRMS model
*Abstract:* A clear understanding of a model is important for its appropriate use. In this article, eleven watershed scale hydrologic and nonpoint-source pollution models are reviewed: AGNPS, AnnAGNPS, ANSWERS, ANSWERS-Continuous, CASC2D, DWSM, HSPF KINEROS, MIKE SHE, PRMS, and SWAT AnnAGNPS, ANSWERS- Continuous, HSPF, and SWAT are continuous simulation models useful for analyzing long-term effects of hydrological changes and watershed management practices, especially agricultural practices. AGNPS, ANSWERS, DWSM, and KINEROS are single rainfall event models useful for anal wing severe actual or design single-event storms and evaluating watershed management practices, especially structural practices. CASC2D, MIKE SHE, and PRMS have both long-term and single-event simulation capabilities. Mathematical bases, the most important and critical elements of these mathematical models, were identified and compiled. In this article, a comprehensive summary of the compilation is presented in tabular form. The flow-governing equations and their solution methods used in each of the eleven models are discussed. The compilation of the mathematical bases of these models would be useful to determine the problems, situations, or conditions for which the models are most suitable, the accuracies and uncertainties expected, their full potential uses and limitations, and directions for their enhancements or new developments. AGNPS, AnnAGNPS, DWSM, HSPF MIKE SHE, and SWAT were found to have all the three major components (hydrology, sediment, and chemical) applicable to watershed-scale

catchments. SWAT is a promising model for continuous simulations in predominantly agricultural watersheds, and HSPF is promising for mixed agricultural and urban watersheds. Among the single-event models, DWSM provides a balance between the simple but approximate and the computationally intensive models and, therefore, is a promising storm event model for agricultural watersheds.


1765. **Watershed systems (PL-534): Hydraulic research of the past, present, and future.**
Hanson GJ and Temple DM.
In: ASAE Annual International Meeting. (Held 12 Jul 1998-16 Jul 1998 at Orlando, Florida.)
St. Joseph, Mich.: American Society of Agricultural Engineers (ASAE); 10 p.; 1998.
*Notes:* ASAE Paper no. 982015
*NAL Call #:* S671.3 .A54


1766. **Weathering and erosion aspects of small catchment research.**
Bricker, O. P.; Paces, T.; Johnson, C. E.; and Sverdrup, H.
In: Biogeochemistry of small catchments: A tool for environmental research/ Moldan, B. and Cerny, J. Chichester, UK: John Wiley & Sons, 1994; pp. 85-105.
*ISBN:* 0-471-93723-1


1767. **Weed management in conservation crop production systems.**
Locke, M. A.; Reddy, K. N.; and Zablotowicz, R. M.
*Weed Biology and Management* 2 (3): 123-132. (2002);
*ISSN:* 1444-6162


1768. **Weed management in conservation tillage systems for wheat production in North and South America.**
Moyer, J R; Roman, E S; Lindwall, C W; and Blackshaw, R E
*Crop Protection* 13 (4): 243-259. (1994)
*NAL Call #:* SB599.C8;
*ISSN:* 0261-2194
*Descriptors:* triticum aestivum/ conservation tillage/ no-tillage/ minimum tillage/ weeds/ weed control/ herbicides/ chemical control/ cover crops/ continuous cropping/ double cropping/ literature reviews/ North America/ South America/ Angiospermae (Angiospermae)/ Triticum spp. (Gramineae)/ angiosperms/ monocots/ plants/ spermatophytes/ vascular plants/ glyphosate/ annuals/ cropping sequences/ erosion control/ herbicides/ perennials
*Abstract:* Soil erosion by wind or water is a serious problem in North and South America. When no-till or reduced tillage is used to control erosion, the density of certain annual and perennial weeds can increase and new weed control techniques are usually required, The effects of conservation tillage on annual and perennial weeds, weeds that are spread by wind, plants from rangelands and pasture as weeds and volunteer plants as weeds are reviewed. Current weed control methods with minimum tillage, herbicides, cover crops and other cultural practices in conservation tillage systems in North and South America are described. Some producers are successfully controlling weeds in continuous summer cropping systems in North America and in double cropping systems that include wheat in the winter and soybean or corn in the summer in Brazil, Argentina and southeastern United States. Successful conservation tillage systems usually involve cropping sequences of three or more crop types and several herbicides. In these cropping sequences, the ground is covered with a crop during most of the period in which the climate is favorable for weed growth. Perennial weeds are a problem in all tillage systems and there is a general dependence on glyphosate for perennial weed control. In successful conservation tillage systems, the amount and cost of herbicides used is similar to that for herbicides used in conventional tillage systems.


1769. **Weed management practices in natural ecosystems: A critical overview.**
Reinhardt, C. F.
*Koedoe* 1: 67-74. (2000);
*ISSN:* 0075-6458
*Descriptors:* Control programs/ Weeds/ Herbicides/ Biological control/ Methodology/ Management
*Abstract:* Increasing public pressure against the use of pesticides and other agricultural inputs has placed increased emphasis on the development of ecologically based pest management. One distinct reaction of the Weed Science discipline has been the swing away from herbicide research to increased research on the basic biology and ecology of weeds in hopes of reduced reliance on "technological crutches" such as herbicides and other practices that are potentially harmful to the environment. Biological control is the long-standing alternative to the use of herbicides and interest in the former practice has been boosted by the realization that the use of herbicides may lead to the development of herbicide resistance in weed populations, and that herbicide residues occur in surface and groundwater. Supporters of herbicide use would point out that biological control is generally not effective in crop production systems, and is basically slow-acting. Debates between protagonists for the exclusive use of one or the other weed management practice tend to obscure the benefits that integration of different techniques are likely to have. For natural ecosystems it is proposed that integration of the more subtle practice of biological control with the use of herbicides, which relatively quickly overwhelm a biological system with mortality, is likely to be the most effective weed management tool. Different weed management practices that could be considered in natural ecosystems are discussed in terms of three key performance rating criteria, viz. activity, selectivity and persistence In this concise review, general discussion is focussed on the fundamentals of weed management practices, with the view to promote concept-based approaches that are critical for the development of effective weed management strategies.

1770. **Weed prevention: Priority research for alternative weed management.**
Jordan, N.
*Journal of Production Agriculture* 9 (4): 485-489. (1996)
*NAL Call #:* S539.5.J68;
*ISSN:* 0890-8524
This citation is provided courtesy of CAB International/CABI Publishing.

1771. **Weed thresholds: Theory and applicability.**
Swanton, C. J.; Weaver, S.; Cowan, P.; Acker, R. van.; Deen, W.; and Shreshta, A.
*Journal of Crop Production* 2 (1): 9-29. (1999)
*NAL Call #:* SB1.J683;
*ISSN:* 1092-678X [JCPRF8].
*Notes:* Special issue: Expanding the context of weed management / edited by Douglas D. Buhler. Includes references.
*Descriptors:* weeds/ weed control/ integrated pest management/ tolerance/ genotype mixtures/ crop weed competition/ growth models/ cropping systems/ guidelines/ plant density/ crop yield/ yield losses/ literature reviews/ integrated weed management
This citation is from AGRICOLA.

1772. **Weighing the health risks of airborne particulates.**
Reichhardt, Tony
*Environmental Science and Technology* 29 (8): 360A. (1995)
*NAL Call #:* TD420.A1E5;
*ISSN:* 0013-936X
*Descriptors:* human (Hominidae)/ animals/ chordates/ humans/ mammals/ primates/ vertebrates/ air quality standards/ epidemiology/ morbidity/ mortality


1773. **Welcome to reality: An overview of a low-input sustainable agriculture (LISA) project in small fruit.**
Goulart, B. L.
*HortTechnology* 6 (4): 354-359. (Oct. 1996-Dec. 1996)
*NAL Call #:* SB317.5.H68;
*ISSN:* 1063-0198
*Descriptors:* small fruits/ fragaria/ rubus/ low input agriculture/ farm inputs/ crop production/ sustainability/ integrated pest management/ research projects/ agricultural research/ extension education/ sustainable agriculture research and education
This citation is from AGRICOLA.

1774. **The WEPP watershed model: Hydrology and erosion.**
Ascough, J. C. II.; Baffaut, C.; Nearing, M. A.; and Liu, B. Y.
*Transactions of the ASAE* 40 (4): 921-933. (July 1997-Aug. 1997)
*NAL Call #:* 290.9-Am32T;
*ISSN:* 0001-2351 [TAAEAJ].
*Notes:* Subtitle: [Part] I.
*Descriptors:* water erosion/ watersheds/ catchment hydrology/ transport processes/ mathematical models/ prediction/ accuracy/ water erosion prediction project/ scale models
*Abstract:* The Water Erosion Prediction Project (WEPP) watershed scale model is a continuous simulation tool that extends the capability of the WEPP hillslope model to provide erosion prediction technology for small cropland and rangeland watersheds. The model is based on fundamentals of erosion theory, soil and plant science, channel flow hydraulics, and rainfall-runoff relationships, and contains hillslopes, channels, and impoundments as the primary components. The hillslope and channel components can be further divided into hydrology and erosion components. Channel infiltration is calculated by a Green-Ampt Mein-Larson infiltration equation. A continuous channel water balance is maintained, including calculation of evapotranspiration, soil water percolation, canopy rainfall interception, and surface depressional storage. The channel peak runoff rate is calculated using either a modified Rational equation or the equation used in the CREAMS model. Flow depth and hydraulic shear stress along the channel are computed by regression equations based on a numerical solution of the steady state spatially varied flow equations. Detachment, transport, and deposition within constructed channels or concentrated flow gullies are calculated by a steady state solution to the sediment continuity equation. The impoundment component routes runoff and sediment through several types of impoundment structures, including farm ponds, culverts, filter fences, and check dams. The purpose of this article is to provide an overview of the model conceptual framework and structure. In addition, detailed mathematical representations of the processes simulated by the channel hydrology and erosion components are presented. The processes simulated by the impoundment component are not described in this article, but it does include impoundment effects on watershed model channel peak discharge and time of concentration calculations.
This citation is from AGRICOLA.

1775. **WEPS and WEPP science commonality project.**
Fox, F. A.; Flanagan, D. C.; Wagner, L. E.; and Deer-Ascough, L.
In: Soil erosion research for the 21st century. Proceedings of the International Symposium. (Held 3 Jan 2001-5 Jan 2001 at Honolulu, Hawaii.) Ascough, J. C. and Flanagan, D. C. (eds.); pp. 376-379; 2001. *ISBN:* 1-892769-16-6
This citation is provided courtesy of CAB International/CABI Publishing.

1776. **Wetland and environmental applications of GIS.**
Lyon, J. G. and McCarthy, Jack
Boca Raton: CRC Press; 373 p., 8 p. of plates: ill. (some col.), maps (some col.); Series: Mapping sciences series. (1995)
*NAL Call #:* GB622.W47--1995;
*ISBN:* 0873718976 (alk. paper)
*Descriptors:* Wetlands---Remote sensing/ Geographic information systems
This citation is from AGRICOLA.

1777. **Wetland birds: Habitat resources and conservation implications.**
Weller, Milton Webster.
Cambridge, UK: Cambridge University Press; xv, 271 p., [26] p. of plates: ill., map. (1999)
*Notes:* Contents note: Introduction -- Wetlands: what, where, and why -- Major groups of birds that use wetlands -- Water and other resource influences -- Foods, feeding tactics, strategies, and guilds -- Bird mobility and wetland predictability -- Other behavioral and physical influences on wetland living -- Spatial and structural patterns -- Habitat dynamics: water, plant succession, and time -- Population consequences of wetland abundance and quality -- How birds influence wetlands -- Conservation implications -- Measures of bird habitat use and quality -- Current status and some conservation

problems -- Conservation and management strategies -- Outlook.
*NAL Call #:* QL698.95-.W45-1999;
*ISBN:* 0521633265 (hb); 0521633621 (pb)
*Descriptors:* Water birds---Ecology/ Wetland animals---Ecology / Birds, Protection of
This citation is from AGRICOLA.

1778. **Wetland ecology: Principles and conservation.**
Keddy, Paul A.
Cambridge, UK; New York, NY: Cambridge University Press; xiv, 614 p.: ill., maps; Series: Cambridge studies in ecology. (2000)
*Notes:* Includes bibliographical references (p. [543]-593).
*NAL Call #:* QH541.5.M3-K44-2000;
*ISBN:* 0521780012 (hb); 0521783674 (pb)
*Descriptors:* Wetland ecology/ Wetland conservation
This citation is from AGRICOLA.

1779. **Wetland indicators: A guide to wetland identification, delineation, classification, and mapping.**
Tiner, Ralph W.
Boca Raton, Fla.: Lewis Publishers; 392 p., 8 p. of plates: ill. (some col.), maps. (1999)
*NAL Call #:* GB624.T564-1999;
*ISBN:* 0873718925 (alk. paper)
*Descriptors:* Wetlands---United States/ Wetland ecology---United States/ Plant indicators---United States
This citation is from AGRICOLA.

1780. **Wetland landscape characterization.**
Lyon, J. G.
Chelsea, MI: Ann Arbor Press; vii, 135 p.: ill. (2001)
*Notes:* Includes bibliographical references (p. 109-129) and index.
*NAL Call #:* QH87.3-.L96-2001;
*ISBN:* 1575041219
*Descriptors:* Wetlands---Remote sensing/ Geographic information systems/ Ecological mapping/ Wetland ecology
This citation is from AGRICOLA.

1781. **Wetland management and conservation of rare species.**
Doust, Lesley Lovett and Doust, Jon Lovett
*Canadian Journal of Botany* 73 (7): 1019-1028. (1995);
*ISSN:* 0008-4026
*Descriptors:* Plantae (Plantae Unspecified)/ plants/ ethics/ genetics/ habitat protection/ habitat quality/ legislation
*Abstract:* The value of wetland is now widely recognized; some legislation requires 'no net loss' of wetlands, although economic incentives still exist for wetland conversion. Rare plants may be protected by law; however, wetlands are rarely managed specifically to converse rare species. Furthermore, it is not always clear how the environment should be manipulated to increase the abundance of such species, since necessary autecological details are rarely available. Species conservation involves demographic and genetic elements, as well as ethical decisions about the merits of transplanting or importing genes through controlled pollinations. Rare species may serve as indicators of habitat quality, although this will depend on the reasons behind the species' rarity. There is a need for multiple-use management plans that incorporate species- and habitat-conservation goals and that implement overall strategies to maintain or enhance the total quantity and quality of wetlands.
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1782. **Wetland Mercury Research: A Review With Case Studies.**
Rood, B. E.
*Current Topics in Wetland Biogeochemistry* 2: 73-108. (1996);
*ISSN:* 1076-4674
*Descriptors:* United States, Florida, Everglades/ wetlands/ mercury/ case studies/ contamination/ literature review/ literature reviews/ biogeochemical cycle/ pollution effects/ biogeochemistry/ United States, Florida, Everglades/ case reports/ Sources and fate of pollution/ Behavior and fate characteristics/ Geochemistry of sediments/ Freshwater pollution
*Abstract:* Interestingly, there is a paucity of information regarding the role that wetlands play in the regional and global cycles of mercury (Zillioux et al., 1993). Eugene Odum has said that "a healthy wetland is an indicator of a healthy watershed" (Oglethorpe Power Corporation, 1990). As such, there is a compelling need to: 1) evaluate the status of mercury contamination in a variety of wetland types, both impacted and unimpacted by regional anthropogenic activities, 2) examine chemical and biological transformations of mercury under the unique ambient conditions associated with wetlands, and 3) reconstruct trends of mercury accumulation in wetlands preserved in the sediment record. The goals of this literature review are to provide wetland scientists with an overview of current issues and observations regarding research of environmental mercury contamination, to identify the critical need for mercury researchers to incorporate detailed wetland studies into current research, and to overview current studies of mercury in wetlands including a case study of mercury paleoecological research in the Florida Everglades.
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1783. **Wetland planting guide for the northeastern United States: Plants for wetland creation, restoration, and enhancement.**
Thunhorst, Gwendolyn A.
St. Michaels, Md.: Environmental Concern; v, 179 p.: ill. (1993)
*NAL Call #:* SB475.9.W48T48-1993;
*ISBN:* 1883226023
*Descriptors:* Wetland landscape design---Northeastern States/ Wetland planting---Northeastern States/ Wetland plants---Northeastern States/ Native plants for cultivation---Northeastern States/ Natural landscaping---Northeastern States/ Restoration ecology---Northeastern States
This citation is from AGRICOLA.

1784. **Wetland plants: Biology and ecology.**
Cronk, J. K. and Fennessy, M. Siobhan.
Boca Raton, Fla.: Lewis Publishers; 462 p.: ill., maps. (2001)
*Notes:* Includes bibliographical references (p. 389-438) and index; Contents note: Introduction to wetland plants -- Wetland plant communities -- The physical environment of wetland plants -- Adaptations to growth conditions in wetlands -- Reproduction of wetland angiosperms -- The primary productivity of wetland plants -- Community dynamics in wetlands -- Invasive plants in wetlands -- Wetland plants in restored and constructed wetlands -- Wetland plants as biological indicators.

*NAL Call #:* QK938.M3-C76-2001;
*ISBN:* 1566703727 (alk. paper)
*Descriptors:* Wetland plants/ Wetlands/ Wetland ecology
This citation is from AGRICOLA.

1785. **Wetland plants: More than just a pretty face?**
Nuttall, C. A.
*Land Contamination and Reclamation* 11 (2): 173-180. (2003);
*ISSN:* 0967-0513
This citation is provided courtesy of CAB International/CABI Publishing.

1786. **Wetland policy issues.**
Leitch, J. A.
Ames, Iowa: Council for Agricultural Science and Technology, 1994. 47 p.
*Notes:* "February 1994."
*Descriptors:* Wetlands---Issues and policy
This citation is from AGRICOLA.

1787. **Wetland processes and water quality: A symposium overview.**
Reddy, K. R. and Gale, P. M.
*Journal of Environmental Quality* 23 (5): 875-877. (Sept. 1994-Oct. 1994)
*NAL Call #:* QH540.J6;
*ISSN:* 0047-2425 [JEVQAA].
*Notes:* Paper presented at the symposium, "Wetland Processes and Water Quality," November 3-4, 1992, Minneapolis, MN. Includes references.
*Descriptors:* wetlands/ water quality/ conferences/ paper summaries
*Abstract:* Wetlands are ecotones that buffer the interactions of terrestrial and aquatic systems. Considered wastelands until relatively recently, their value is currently being recognized with greater public awareness and development of a national policy. Wetlands protect aquatic systems from upland environments through sedimentation and filtration of runoff providing environments for nutrient assimilation. Likewise, wetlands can protect uplands from aquatic systems by diverting and dissipating floodwater volume and energy. Major research needs in the area of wetland science include: (i) wetland delineation, (ii) characterization of wetland soils, and (iii) biogeochemical processes in soil and water column regulating the water quality. This overview provides a brief introduction to the papers presented at a symposium entitled "Wetland Processes and Water Quality" sponsored by Division A-5 of the American Society of Agronomy and So Divisions within the Soil Science Society of America.
This citation is from AGRICOLA.

1788. **Wetland restoration, flood pulsing, and disturbance dynamics.**
Middleton, Beth.
New York: J. Wiley; xi, 388 p.: ill., maps. (1999)
*Notes:* Includes bibliographical references (p. 303-369) and index.
*NAL Call #:* QH541.5.M3M54-1999;
*ISBN:* 047129263X (cloth)
*Descriptors:* Wetland ecology/ Restoration ecology
This citation is from AGRICOLA.

1789. **Wetland restoration in central Europe: Aims and methods.**
Pfadenhauer, J. and Grootjans, A.
*Applied Vegetation Science* 2 (1): 95-106. (May 1999)
*NAL Call #:* QK900-.A66;
*ISSN:* 1402-2001 [AVSCFC].
*Notes:* Special issue: From basic to applied ecology -- vegetation science for nature conservation / edited by S. Gusewell, J. Pfadenhauer, and E. van der Maarel. Includes references.
*Descriptors:* wetlands/ reclamation/ emission/ air pollutants/ fens/ water/ species diversity/ plant communities/ botanical composition/ spatial variation/ temporal variation/ land use/ quantitative analysis/ qualitative analysis/ groundwater/ water quality/ literature reviews/ central Europe
This citation is from AGRICOLA.

1790. **Wetland rice soils as sources and sinks of methane: A review and prospects for research.**
Kumaraswamy, S.; Rath, A. K.; Ramakrishnan, B.; and Sethunathan, N.
*Biology and Fertility of Soils* 31 (6): 449-461. (2000)
*NAL Call #:* QH84.8.B46;
*ISSN:* 0178-2762
*Descriptors:* flooded rice/ rice soils/ paddy soils/ soil bacteria/ anaerobes/ methane production/ methane/ oxidation/ emission/ oryza sativa/ roots/ pollution control/ fertilizers/ pesticides/ nitrification inhibitors/ community ecology/ biological activity in soil/ literature reviews/ methanotrophy
This citation is from AGRICOLA.

1791. **Wetland Risk Assessment.**
Pascoe, G. A.
*Environmental Toxicology and Chemistry* 12 (12): 2293-2307. (1993)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268
*Descriptors:* wetlands/ contamination/ risk assessment/ United States/ reviews/ ecosystems/ ecological effects / environmental effects/ pollutants/ geochemistry/ risks/ ecological crisis/ ecosystem disturbance/ Wetlands/ Toxicity testing/ Freshwater pollution/ Environment
*Abstract:* Wetlands represent unique environments for assessing ecological risks. Habitats may vary from riverine to basin type and include such diverse media as surface waters, sediments, soils, and ground water, with both terrestrial and aquatic biota. Given the diversity of wetland habitats, a number of species may be expected to be fairly unique to a particular site. Wetland ecosystems may be impacted by chemical contamination or by nonchemical stressors such as temperature or suspended solids. A key to assessing ecological risks to chemically contaminated wetlands is determining the degree of contaminant bioavailability from multiple environmental media. Chemical and physical factors of the various wetland habitats must be evaluated for their role in chemical release, transformation, and availability. Approaches to assessing ecological risks may extend from simple benchmark or literature comparisons to direct measurement of exposure and toxicity through laboratory and/or field tests. To increase the utility of wetland risk assessments, the uncertainty inherent in the complex habitats and in the chemistry that governs contaminant bioavailability should be minimized. This can be most readily accomplished by applying an assessment methodology triad of ecology, chemistry, and toxicology to characterize ecological risks. Literature toxicity information and laboratory and field data are used to evaluate potential threats to individuals or species in each trophic level of the wetland food web. The ecological data are integrated with this information to assess whether the concentrations of contaminants and the observed or predicted toxicity relate to actual ecological effects. The ecological relevance of the expected or measured biological responses is

of prime importance in predicting risks to the wetland ecosystem. Applications of this approach to risk assessments are presented as case studies of metals-contaminated wetlands at Milltown Reservoir, Montana, and Kesterson Reservoir, California.


1792. **Wetland soils: Genesis, hydrology, landscapes, and classification.**
Richardson, J. L. and Vepraskas, Michael J.
Boca Raton, Fla.: Lewis Publishers; 417 p., 8 p. of plates: ill. (some col.), maps. (2001)
*NAL Call #:* S592.17.H93-W48-2001;
*ISBN:* 1566704847 (alk. paper)
*Descriptors:* Hydric soils/ Wetlands
This citation is from AGRICOLA.

1793. **Wetland soils of the prairie potholes.**
Richardson, J. L.; Arndt, J. L.; and Freeland, J.
*Advances in Agronomy 52: 121-171.* (1994)
*NAL Call #:* 30-Ad9;
*ISSN:* 0065-2113 [ADAGA7]
*Descriptors:* wetland soils/ prairie soils/ prairies/ soil properties/ soil sequences/ literature reviews/ Alberta/ Saskatchewan/ Manitoba/ north central states of USA
This citation is from AGRICOLA.

1794. **Wetlands.**
Mitsch, William J. and Gosselink, James G.
New York: Van Nostrand Reinhold; xiii, 722 p.: ill., maps. (1993)
*Notes:* 2nd ed.; Includes bibliographical references (p. 643-698) and index.
*NAL Call #:* QH541.5.M3M59-1993;
*ISBN:* 0442008058
*Descriptors:* Wetland ecology---United States/ Wetlands---United States/ Wetland conservation---United States
This citation is from AGRICOLA.

1795. **Wetlands.**
Mitsch, William J. and Gosselink, James G.
New York: John Wiley; xiii, 920 p.: ill., maps. (2000)
*Notes:* 3rd ed.; Includes bibliographical references (p. 785-892) and indexes.
*NAL Call #:* QH104-.M57-2000;
*ISBN:* 047129232X (cloth: alk. paper)
*Descriptors:* Wetland ecology---United States/ Wetlands---United States/ Wetland management---United States
This citation is from AGRICOLA.

1796. **Wetlands and ground water in the United States.**
Stone, Andrew W. and Stone, Amanda J. Lindley
Dublin, Ohio: American Ground Water Trust; Concord, N.H.: Audubon Society of New Hampshire; iv, 100 p.: ill. (1994)
*Notes:* Includes bibliographical references (p. 79-82).
*NAL Call #:* GB624.S76--1994;
*ISBN:* 0964118602
*Descriptors:* Wetlands---United States/ Groundwater---United States
This citation is from AGRICOLA.

1797. **Wetlands: Characteristics and boundaries.**
National Research Council (U.S.), Committee on Characterization of Wetlands
Washington, D.C.: National Academy Press; xvii, 307 p.: ill., maps. (1995)
*NAL Call #:* QH87.3.W475--1995;
*ISBN:* 0309051347 (cloth)
http://www.nap.edu/books/0309051347/html/
*Descriptors:* Wetlands / Wetland ecology/ Wetland conservation---Government policy---United States
This citation is from AGRICOLA.

1798. **Wetlands classification.**
Detenbeck, Naomi Elizabeth.; United States. Environmental Protection Agency. Office of Science and Technology; and United States. Environmental Protection Agency. Office of Wetlands, Oceans and Watersheds.
In: Methods for evaluating wetland condition; Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, 2002.
*Notes:* Original title: Wetlands classification (#7); Title from web page. "March 2002." "EPA-822-R-02-017." "Prepared jointly by the U.S. Environmental Protection Agency, Health and Ecological Criteria Division (Office of Science and Technology) and Wetlands Division Office." Description based on content viewed April 10, 2003. Includes bibliographical references.
*NAL Call #:* QH541.5.M3-D47-2002
http://www.epa.gov/waterscience/criteria/wetlands/7Classification.pdf
*Descriptors:* Wetlands---United States/ Wetlands---United States --- Classification
This citation is from AGRICOLA.

1799. **Wetlands: Guide to science, law, and technology.**
Dennison, Mark S. and Berry, James F.
Park Ridge, N.J., U.S.A.: Noyes Publications; xxiv, 439 p.: ill., maps. (1993)
*Notes:* Includes bibliographical references (p. 352-383) and indexes.
*NAL Call #:* QH87.3.D45--1993;
*ISBN:* 081551333X (cloth):
*Descriptors:* Wetlands/ Wetland conservation/ Wetlands---Law and legislation---United States/ Wetland ecology
This citation is from AGRICOLA.

1800. **Wetlands: History, current status, and future.**
Hook, D. D.
*Environmental Toxicology and Chemistry* 12 (12): 2157-2166. (Dec. 1993)
*NAL Call #:* QH545.A1E58;
*ISSN:* 0730-7268 [ETOCDK].
*Notes:* Annual Review Issue: Wetland Ecotoxicology and Chemistry. Includes references.
*Descriptors:* wetlands/ bogs/ fens/ moorland/ history/ uses/ environmental protection/ projections/ literature reviews
This citation is from AGRICOLA.

1801. **Wetlands in the northern Great Plains: A guide to values and management.**
Berry, Charles R.; Buechler, Dennis G.; Wentz, W. Alan.; South Dakota State University. Cooperative Extension Service; and U.S. Prairie Pothole Joint Venture.
Washington, D.C.?: U.S. Fish and Wildlife Service; Brookings, S.D.: Agricultural Extension Service, South Dakota State University; 13 p.: col. ill. (1993)
*Notes:* Caption title. "Published by a cooperative agreement between the U.S. Fish and Wildlife Service (U.S. Prairie Pothole Joint Venture) and the Agricultural Extension Service, South Dakota State University, Brookings, S.D. Funding was provided by the U.S. Fish and Wildlife Service, the Federal Highway Administration, and the U.S. Army Corps of Engineers"--P. 13. "Update of Wetland values and management ... 1981"--P. 13.

*NAL Call #:* QH541.5.M3B47--1993
*Descriptors:* Wetland ecology Great Plains/ Wetlands Great Plains
This citation is from AGRICOLA.

1802. **Wetlands of the interior southeastern United States: Conference summary statement.**
Trettin, C. C.; Aust, W. M.; Davis, M. M.; Weakley, A. S.; and Wisniewski, J.
*Water, Air and Soil Pollution* 77 (3/4): 199-205. (Oct. 1994)
*NAL Call #:* TD172.W36;
*ISSN:* 0049-6979 [WAPLAC].
*Notes:* Special issue: Wetlands of the interior southeastern United States / edited by C.C. Trettin, W.M. Aust, and J. Wisniewski. Proceedings of the Southern Appalachian Man and the Biosphere Conference on "Wetland Ecology, Management, and Conservation," held September 28-30, 1993, Knoxville, Tennessee. Includes references.
*Descriptors:* wetlands/ plant communities/ plant ecology/ community ecology/ ecosystems/ nature conservation/ conferences/ southeastern states of USA
This citation is from AGRICOLA.

1803. **What is watershed stability? A review of the foundation concept of dynamic equilibrium in watershed management: Proceedings of the Sixth Biennial Watershed Management Conference, Sixth Biennial Watershed Management Conference (Held 23-25 October 1996 at Lake Tahoe, Califoria/Nevada).**
Sommarstrom, Sari
Davis, CA: Centers for Water and Wildland Resources, University of California; Series: Water Resources Center report no. 92; vi, 193 p.: ill. (1997)
*Notes:* "April 1997."
*NAL Call #:* TD224.C2W37--no.92;
*ISBN:* 1887192069
*Descriptors:* Watershed management---United States---Congresses/ Watersheds---United States---Congresses/ Watershed management---California---Congresses
This citation is from AGRICOLA.

1804. **Which decision support tools for the environmental management of nitrogen?**
Meynard, J. M.; Cerf, M.; Guichard, L.; Jeuffroy, M. H.; and Makowski, D.
*Agronomie* 22 (7/8): 817-829. (2002)
*NAL Call #:* SB7.A3;
*ISSN:* 0249-5627
This citation is provided courtesy of CAB International/CABI Publishing.

1805. **White Paper Summaries.**
Humenik, F.; Rice, M.; and National Center for Manure and Animal Waste Management.
National Center for Manure and Animal Waste Management, 2001.
*Notes:* 64 pp.; Produced through a USDA Fund for Rural America Grant (application/pdf)
http://www.cals.ncsu.edu/waste_mgt/natlcenter/summary.pdf

1806. **White papers on animal agriculture and the environment.**
National Center for Manure & Animal Waste Management; Midwest Plan Service; and United States. Dept. of Agriculture
Raleigh, NC: National Center for Manure & Animal Waste Management, 2002.
*NAL Call #:* TD930.2-.W45-2002
*Descriptors:* Animal waste---Environmental aspects/ Agricultural wastes---Environmental aspects/ Manures
*Abstract:* Topics covered include: odor mitigation; site selection of animal operations; air quality and emissions; production/waste management systems; health effects; particulate matter emissions; ammonia emissions; land application; treatment lagoons; animal diets; closure of earthen manure structures; remediation and legal structures; innovative policies; pathogens; manure marketing; and cost benefit analysis to improve social welfare.
This citation is from AGRICOLA.

1807. **Why Bacillus thuringiensis insecticidal toxins are so effective: Unique features of their mode of action.**
Aronson, Arthur I and Shai, Yechiel
*FEMS Microbiology Letters* 195 (1): 1-8. (2001);
*ISSN:* 0378-1097
*Descriptors:* Bacillus thuringiensis toxins: insecticide, toxin/ Bacillus thuringiensis (Endospore forming Gram Positives)/ Diptera (Diptera)/ Animals/ Arthropods/ Bacteria/ Eubacteria/ Insects/ Invertebrates/ Microorganisms
*Abstract:* The spore-forming bacterium Bacillus thuringiensis produces intracellular inclusions comprised of protoxins active on several orders of insects. These highly effective and specific toxins have great potential in agriculture and for the control of disease-related insect vectors. Inclusions ingested by larvae are solubilized and converted to active toxins in the midgut. There are two major classes, the cytolytic toxins and the delta-endotoxins. The former are produced by B. thuringiensis subspecies active on Diptera. The latter, which will be the focus of this review, are more prevalent and active on at least three orders of insects. They have a three-domain structure with extensive functional interactions among the domains. The initial reversible binding to receptors on larval midgut cells is largely dependent upon domains II and III. Subsequent steps involve toxin insertion into the membrane and aggregation, leading to the formation of gated, cation-selective channels. The channels are comprised of certain amphipathic helices in domain I, but the three processes of insertion, aggregation and the formation of functional channels are probably dependent upon all three domains. Lethality is believed to be due to destruction of the transmembrane potential, with the subsequent osmotic lysis of cells lining the midgut. In this review, the mode of action of these delta-endotoxins will be discussed with emphasis on unique features. © Thomson

1808. **Wildlife damage management research needs: Perceptions of scientists, wildlife managers, and stakeholders of the USDA/Wildlife Services program.**
Bruggers, Richard L; Owens, Richard; and Hoffman, Thomas
*International Biodeterioration and Biodegradation* 49 (2-3): 213-223. (2002)
*NAL Call #:* QH301.I54;
*ISSN:* 0964-8305
*Descriptors:* bird (Aves): pest/ human (Hominidae)/ mammal (Mammalia): pest/ Animals/ Birds/ Chordates/ Humans/ Mammals/ Nonhuman Mammals/ Nonhuman Vertebrates/ Primates/ Vertebrates/ USDA/ APHIS Wildlife Services program/ administrative guidance/ agriculture/

aquaculture/ aviation/ invasive species/ legislative guidance/ livestock/ overabundant populations/ research needs assessment/ scientist perceptions/ stakeholder perceptions/ timber/ wildlife damage management research/ wildlife manager perceptions/ wildlife borne diseases/ wildlife human conflicts
*Abstract:* This paper presents the results of a nationwide research needs assessment of the important wildlife-human conflict issues and associated research needs of the USDA/APHIS-Wildlife Services (WS) program and its stakeholders. Thirty-six WS State Directors, 23 WS/National Wildlife Research Center (NWRC) scientists and 6 members of the National Wildlife Services Advisory Committee (NWSAC) to the US Secretary of Agriculture responded to a request for participation. This paper compares these current research needs with previous regional and national research needs assessments for wildlife damage management in the United States. Important national problems identified included issues related to aviation, timber, agriculture, aquaculture, and livestock industries, as well as wildlife-borne diseases, invasive species, and overabundant wildlife populations. This assessment provides useful input, along with legislative and administrative guidance, to NWRC for allocating resources to specific research projects that address the WS program's needs for knowledge and new methods.


1809. **Wildlife exposure to organophosphorus insecticides.**
Sanchez Hernandez, J. C.
*Reviews of Environmental Contamination and Toxicology 172: 21-63.* (2001)
*NAL Call #:* TX501.R48;
*ISSN:* 0179-5953 [RCTOE4]
*Descriptors:* organophosphorus insecticides/ exposure/ cholinesterase/ markers/ monitoring/ wildlife/ nontarget organisms/ literature reviews
This citation is from AGRICOLA.

1810. **Wind erosion air quality project: An interim report of the Northwest Columbia Plateau.**
Papendick, Robert I.; Veseth, Roger; United States. Environmental Protection Agency; and Washington State University. College of Agriculture and Home Economics
Pullman, Wash.: Washington State University, College of Agriculture and Home Economics; Series: Miscellaneous publication (Washington State University. College of Agriculture and Home Economics) no. 184; 63 p.: ill. (some col.), maps (some col.). (1996)
*Notes:* "December 1996." Includes bibliographical references (p. 62-63).
*NAL Call #:* TD883.5.W22C65--1996
*Descriptors:* Air Pollution---Washington State---Columbia Plateau/ Air quality---Washington State---Columbia Plateau/ Wind erosion---Washington State---Columbia Plateau/ Soil conservation---Washington State---Columbia Plateau
This citation is from AGRICOLA.

1811. **Wind erosion and air quality research needs in the Pacific Northwest.**
Saxton, K. E.
In: 1993 International Summer Meeting sponsored by The American Society of Agricultural Engineers and The Canadian Society of Agricultural Engineering. (Held 20 Jun 1993-23 Jun 1993 at Spokane, Washington.)
St. Joseph, Mich.: American Society of Agricultural Engineers; 16 p.; 1993.
*Notes:* Paper no. 932121; Papers of the American Society of Agricultural Engineers;
*ISSN:* 0149-9890
*NAL Call #:* 290.9-Am32P
*Descriptors:* wind erosion/ air quality/ dust/ particles/ dust control/ research/ Pacific states of USA
This citation is from AGRICOLA.

1812. **Windbreaks and specialty crops for greater profits.**
Brandle, J. R.; Hodges, L.; and Stuthman J.
In: Agroforestry and sustainable systems symposium proceedings. (Held 7 Aug 1994-10 Aug 1994 at Fort Collins, Colorado.)
Fort Collins, Colo.: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; pp. 81-91; 1995.
*NAL Call #:* aSD11.A42-no.261
*Descriptors:* shelterbelts/ trees/ shrubs/ wind/ wind erosion/ crop yield/ crop quality/ earliness/ crop management/ habitats/ sustainability/ microclimate/ stresses/ planting date/ harvesting date/ economic analysis/ literature reviews
This citation is from AGRICOLA.

1813. **Windbreaks as a pesticide drift mitigation strategy: A review.**
Ucar, T. and Hall, F. R.
*Pest Management Science* 57 (8): 663-675. (Aug. 2001)
*NAL Call #:* SB951-.P47;
*ISSN:* 1526-498X [PMSCFC]
*Descriptors:* windbreaks/ pesticides/ application/ drift/ spraying/ deposition/ literature reviews/ drift mitigation strategies
*Abstract:* The use of natural and artificial barriers to mitigate pesticide drift from agricultural and forest applications is discussed. This technique has been considered as an alternative to current methods at a time when environmental concerns are under great public scrutiny. There has been a variety of research experiments on this subject from New Zealand to The Netherlands which have documented reductions in spray drift of up to 80-90%. However, there are still enormous data gaps to utilize this method accurately. The aerodynamic factors of wind barriers and shelter effects on crop growth and yield have been well investigated. In contrast, some of the important aspects of drift mitigation, eg porosity and turbulence, have been difficult to obtain and no standard methodologies are currently available to evaluate and classify windbreaks and shelterbelts or to determine their efficiency in reducing drift. Thus there is a significant opportunity to incorporate windbreaks into the tool set of drift mitigation tactics. Government policies, initiatives, legislation, etc, which currently address water quality, BMP, stewardship, buffers, etc, are issues which so far have not included windbreaks as a valuable drift mitigation strategy.
This citation is from AGRICOLA.

1814. **Winter habitat of selected stream fishes and potential impacts from land-use activity.**
Cunjak, R. A.
In: Workshop on the science and management for habitat conservation and restoration strategies (HabCARES) in the great lakes / Comptes rendus d'un atelier sur la science et la gestion des stratégies de conservation et de restauration des

habitats (HabCARES) dans le bassin des Grands Lacs. (Held Nov 1994 at Kempenfelt, Ontario, Canada.)
Kelso, J. R. (eds.)
Ottawa, Ontario, Canada: National Research Council of Canada;
pp. 267-282; 1996.
*Notes:* Also published as: Canadian journal of fisheries and aquatic sciences / Journal canadien des sciences halieutiques et aquatiques [can. J. Fish. Aquat. Sci./J. Can. Sci. Halieut. Aquat.] 53 (supplement 1);
*ISSN:* 0706-652X
*Descriptors:* habitat/ habitat selection/ winter/ environmental impact/ land use/ metabolism/ habitat improvement/ rivers/ Salmonidae/ Canada/ Conservation, wildlife management and recreation
*Abstract:* This paper reviews the habitat characteristics and the behaviour of selected stream fishes during winter in temperate-boreal ecosystems. Emphasis is placed on the salmonid fishes upon which most winter research has been directed. As space is the primary factor regulating stream fish populations in winter, aspects of winter habitat are considered at various spatial scales from microhabitat to stream reach to river basin. Choice of winter habitat is governed by the need to minimize energy expenditure, with the main criterion being protection from adverse physicochemical conditions. The distance moved to wintering habitats, and the continued activity by many fishes during the winter, need to be considered when making management decisions regarding fish habitat. How habitat is affected by land-use activity in stream catchments is discussed with reference to impacts from water withdrawal, varying discharge regimes, and erosion or sedimentation. Even stream enhancement practices can deleteriously affect stream habitat if project managers are unaware of winter habitat requirements and stream conditions. Maintenance of habitat complexity, at least at the scale of stream sub-basin, is recommended to ensure the diversity of winter habitats for fish communities.


1815. **Year end review of recycling and composting.**
Glenn, J.
*Biocycle* 38 (12): 49-53. (Dec. 1997)
*NAL Call #:* 57.8-C734;
*ISSN:* 0276-5055
*Descriptors:* waste utilization/ United States
This citation is from AGRICOLA.