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Agricultural Air Emissions Effects on Water Quality

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Agricultural Air Emissions Effects on Water Quality

1. **Air today -- gone tomorrow.**
Thomas, H.
New-phytol. 139: 1 pp.225-229. (May 1998).
NAL Call #: 450 N42

Descriptors: air-pollutants; air-pollution; eutrophication; deamination; metabolism; plant-development; nitrogen-cycle; nitrogen; nutrient-availability; ozone; ecosystems; adaptability; biodiversity; abiotic-injuries; plant-communities

2. **The anthropogenic nitrogen cycle in the Netherlands.**
Olsthoorn, C. S. M. and Fong, N. P. K.
Nutr-cycl-agroecosyst. 52: 2/3 pp.269-276. (Oct 1998).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: nitrogen-cycle; agriculture; nitrous-oxide; nitrogen-balance; emission; eutrophication; pollution; surface-water; groundwater; nitrate; leaching; ammonia; pollution-control; industry; households; traffic; losses-from-soil; biological-activity-in-soil; netherlands
Abstract: Results of a study on the nitrogen flows in the Netherlands are presented for three different years. The details given for 1995 are preliminary. The data are derived from a material balance sheet investigation. The objective of the study is to present a complete, integrated and accurate overview of nitrogen losses from the anthropogenic nitrogen cycle in the country with respect to present and possible future nitrous oxide emissions. Losses are analyzed in terms of economic sources and the recipient environmental compartments. The nitrogen losses account for about 25% of the total nitrogen input in the anthropogenic nitrogen cycle. Most of the losses occur in agriculture (67%), whereas industry, traffic and households each contribute about 10% to the total nitrogen loss. About 15% of the total nitrogen input in the national economy ends up in the environment, where it gives rise to adverse effects as the eutrophication of fresh surface water and the contamination of ground water with nitrate. A comparison of the results for different years shows that little progress has been made in emission reductions so far. Ammonia emissions have been reduced, but at the expense of an increase of the nitrogen input to agricultural soils.

3. **An assessment of human influences on fluxes of nitrogen from the terrestrial landscape to the estuaries and continental shelves of the North Atlantic Ocean.**
Howarth, R. W.
Nutr-cycl-agroecosyst. 52: 2/3 pp.213-223. (Oct 1998).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: nitrogen-cycle; estuaries; ecosystems; nitrogen; deposition; eutrophication; coastal-areas; denitrification; biogeochemistry; water-pollution; fertilizers; sewage; rivers; geographical-variation; nitrogen-fixation; air-pollution; foods; feeds; nitrogen-content; ammonium; nitrogen-oxides; atlantic-ocean
Abstract: Our analysis for the International SCOPE Nitrogen Project shows that the fluxes of nitrogen in rivers to the coast of the North Atlantic Ocean vary markedly among regions, with the lowest fluxes found in northern Canada (76 kg N km-2 yr-1) and the highest fluxes found in the watersheds of the North Sea (1450 kg N km-2 yr-1). Non-point sources of nitrogen dominate the flux in all regions. The flux of nitrogen from the various regions surrounding the North Atlantic is correlated (r2 = 0.73) with human-controlled inputs of nitrogen to the regions (defined as net inputs of nitrogen in food, nitrogen fertilizer, nitrogen fixation by agricultural crops, and atmospheric deposition of oxidized nitrogen), and human activity has clearly increased these nitrogen flows in rivers. On average, only 20% of the human-controlled inputs of nitrogen to a region are exported to the ocean in riverine flows; the majority (80%) of these regional nitrogen inputs is stored in the landscape or denitrified. Of all the nitrogen inputs to regions, atmospheric

deposition of NOy is the best predictor of riverine export of nitrogen from non-point sources ($r2 = 0.81$). Atmospheric deposition of this oxidized nitrogen, most of which derives from fossil-fuel combustion, may be more mobile in the landscape than are regional inputs of nitrogen from fertilizer, nitrogen fixation in agriculture, and nitrogen in foods and feedstocks. Agricultural sources of nitrogen, although larger total inputs to most temperate regions surrounding the North Atlantic Ocean, appear to be more tightly held in the landscape. Deposition of ammonium from the atmosphere appears to be a very good surrogate measure of the leakiness of. nitrogen from agricultural sources to surface waters. This suggests a management approach for controlling 'surplus' nitrogen used in agricultural systems. The sum of NOy and ammonium deposition proves to be an amazingly powerful predictor of nitrogen fluxes from non-point sources to the coastal North Atlantic Ocean for temperate-zone regions ($r2 = 0.92$; $p = 0.001$). By comparing fluxes with some estimates of what occurs in watersheds with minimal human impact, it appears that human activity has increased riverine nitrogen inputs to the ocean by some 11-fold in the North Sea region, by 6-fold for all of Europe, and by 3-fold for all of North America. These increased flows of nitrogen have clearly led to severe eutrophication in many estuaries, and have probably contributed to some eutrophication on the continental shelf in the North Sea and in the Gulf of Mexico. In other regions, however, the input of nitrogen to continental shelves is dominated by cross-shelf advection from deep-Atlantic waters, and the increased inputs from rivers are relatively minor.

4. **Assumed non-point water pollution based on the nitrogen budget in Polish agriculture.**
Sapek, A. and Sapek, B.
Water-sci-technol. 28: 3/5 pp.483-488. (1993).
NAL Call #: TD420.A1P7

Descriptors: water-pollution; air-pollution; nitrogen; agricultural-production; nitrogen-balance; poland

5. **Atmospheric deposition of pesticides in a small southern Saskatchewan watershed.**
Waite, D. T., Grover, R., Westcott, N. D., Irvine, D. G., Kerr, L. A., and Sommerstad, H.
Environ-toxicol-chem. 14: 7 pp.1171-1175. (July 1995).
NAL Call #: QH545.A1E58

Descriptors: herbicides; insecticides; deposition; atmosphere; watersheds; detection; seasonal-variation; saskatchewan
Abstract: Weekly atmospheric deposition samples were collected from early May to early September during 1984 to 1987 in a small agricultural watershed near Regina, Saskatchewan, an area in the midst of extensive agricultural pesticide use in the Canadian prairies. "Bulk" deposition samples were collected weekly in duplicate and analyzed for six herbicides (bromoxynil, 2,4-D, dicamba, diclofop, triallate, and trifluralin) and five insecticides (carbaryl, carbofuran, chlorpyrifos, deltamethrin, and dimethoate). In general, no significant differences were found among the duplicate samples. Over the 4-year period, the frequency of weekly detection of herbicides during the growing seasons was 0, 32, 39, 53, 58, and 67% for trifluralin, bromoxynil, triallate, diclofop, dicamba, and 2,4-D, respectively. For insecticides, only carbaryl and carbofuran were detected in one to two samples in the years for which the insecticides were analyzed. This infrequent detection reflected the relatively high detection limits set for the

insecticides as compared to those for the herbicides. The seasonal herbicide atmospheric deposits during the growing period over the 4-year period (mg ha-1) ranged from 90 to 234 (bromoxyml), 386 to 1,374 (2,4-D), 20 to 219 (dicamba), 43 to 338 (diclofop), and 9 to 260 (triallate). Highest deposition rates were measured during and immediately following the spraying periods, with lesser, but significant, amounts also being detected during the harvest operations in August.

6. **Atmospheric transport and air-surface exchange of pesticides.**
Bidleman, T. F.
Water-air-soil-pollut. 115: 1/4 pp.115-166. (Oct 1999).
NAL Call #: TD172.W36

Descriptors: pesticides; organochlorine-pesticides; pesticide-residues; enantiomers; gas-exchange; atmosphere; surfaces; release; sorption; air-pollutants; soil; surface-water; sea-water; physicochemical-properties; volatilization; drift; equations; emission; deposition; pollution; water-pollution; polluted-soils; literature-reviews; persistent-organic-pollutants; airborne-pesticides

7. **Avoiding pollution from poultry manure.**
Archer, J.
World's-poult-sci-j. 49: 2 pp.167-170. (July 1993).
NAL Call #: 47.8 W89

Descriptors: poultry-manure; nitrates; surface-water; water-pollution; groundwater-pollution; air-pollution; odors; legislation; uk

8. **Balancing the animal's nutritional needs with environmental stewardship.**
Satter, L. D. and Wu, Z. G.
Adv-dairy-technol. Edmonton: University of Alberta, Faculty of Extension, c1989-. 2000. v. 12 p. 43-57.
URL: http://www.wcds.afns.ualberta.ca/Proceedings/2000/Chapter05.htm
NAL Call #: SF223.W478

Descriptors: dairy-cows; environmental-impact; air-pollution; water-pollution; cattle-manure; nitrogen; phosphorus; feed-formulation

9. **Cattle feedlot manure and wastewater management practices.**
Sweeten, J. M.
Animal waste utilization effective use of manure as a soil resource. pp.125-155. (1998).
NAL Call #: S655.A57 1998

Descriptors: feedlots; cattle-manure; waste-utilization; application-to-land; pollution-control; air-pollution; water-pollution; waste-water; management; waste-management

10. **Dairy farming in the Netherlands in transition towards more efficient nutrient use.**
Bruchem, J. van., Schiere, H., and Keulen, H. van.

Livest-prod-sci. 61: 2/3 pp.145-153. (Oct 1999).
NAL Call #: SF1.L5

Descriptors: dairy-farming; animal-nutrition; use-efficiency; sustainability; emission; acid-rain; air-pollutants; groundwater; groundwater-pollution; phosphate; nitrogen; ammonia; nitrous-oxide; nitric-oxide; volatilization; leaching; efficiency; feeds; feces; urine; management; cattle-manure; netherlands

11. **Diffusion analysis of N2O cycling in a fertilized soil.**
Yoh, M., Toda, H., Kanda, K., and Tsuruta, H.
Nutr-cycl-agroecosyst. 49: 1/3 pp.29-33. (1997).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: volcanic-ash-soils; nitrous-oxide; gas-production; microbial-activities; emission; losses-from-soil; diffusion; movement-in-soil; nitrogen-cycle; soil-depth; soil-profiles; nitrogen-fertilizers; ammonium-sulfate; sodium-nitrate; temporal-variation; leaching; groundwater; sources; nitrous-oxide-turnover
Abstract: The behavior of nitrous oxide (N2O) in fertilized soil was studied in terms of soil fluxes, the production rates at various depths and the turnover in soil. The diffusive losses of N2O to the atmosphere calculated from soil N2O profile compared favorably with the flux directly determined with a closed chamber technique. The estimate of N2O production rates at several depths demonstrated that the sites of N2O production was only near the soil surface. The calculated residence time of N2O in the entire soil column studied was only 1.4 hour during active emission period and less than 1 day even in the later period having trace N2O emission. The prolonged N2O emission observed after the active phase was due likely to a lasting N2O production rather than a supply from the soil N2O reservoir. The results suggested that most N2O in soil was emitted quite promptly to the atmosphere after its production. A minor role of soil as an N2O reservoir is emphasized from the viewpoint of the origin of groundwater N2O.

12. **Effect of agricultural practices on the nitrogen losses to the environment.**
Ramos, C.
Fertil-res. 43: 1/3 pp.183-189. (1995/1996).
NAL Call #: S631.F422

Descriptors: agricultural-soils; nitrogen-cycle; nitrogen; losses-from-soil; runoff; nitrate; leaching; identification; nitrification; ammonia; volatilization; nitrous-oxide; fertilizers; nutrient-sources; application-rates; timing; irrigation; cover-crops; crop-residues; tillage; environmental-impact; water-pollution; air-pollution

13. **The effect of nitrogen management in agricultural production on water and air quality.**
Zebarth, B. J., Paul, J. W., and Van Kellck, R.
Agric-ecosyst-environ. 72: 1 pp.35-52. (Jan 12, 1999).
NAL Call #: S601.A34

Descriptors: crop-management; animal-husbandry; nitrogen; soil-fertility; soil-management; farmyard-manure; feeds; leaching; surface-water; groundwater; deposition; fertilizers; water-quality; denitrification; nitrogen-cycle; british-columbia; soil-nutrient-management
Abstract: The purpose of this study was to use a nitrogen (N) budget calculation approach to estimate the effect of agricultural production in the Lower Fraser Valley, British Columbia, Canada, on N loss to the environment under 1991 crop and animal management practices, the change in N loss to the environment between 1981 and 1991, and the extent to which these losses could be reduced through improved management practices. Ammonia losses to the atmosphere from animal production were substantial, in excess of 7250 (t N) year-1, but could be reduced by up to 30% through improved manure management and animal diets. Root-zone N losses to surface and groundwater were estimated as the N surplus (the excess of N additions from inorganic fertilizer, manure, and atmospheric deposition over N removals by the crop and denitrification) for the root zone of land in agricultural production. The N surplus for the study area as a whole was 68 (kg N) ha-1 land in agricultural production, whereas an N surplus of <50 (kg N) ha-1 would be expected under optimal N management. Calculation of N surplus values on the basis of individual districts as compared to the entire study area predicted a greater effect of agricultural production on water quality because of a non-optimal distribution of nutrients. High N surplus values within individual districts, up to 238 (kg N) ha-1, were attributed to animal intensification, particularly poultry and swine production which does not requite a local land base for feed production. Root-zone N losses increased between 1981 and 1991, primarily because of the concentration of animal production in specific geographical areas and on a diminished agricultural. land base. Improved fertilizer and manure management was predicted to reduce the N surplus of the study area from 68 to 5 (kg N) ha-1; however, less than one-half of this reduction could be practically realized at this time. Improved animal diets were predicted to reduce the N surplus from 68 to 45 (kg N) ha-1, with most of the reduction occurring in areas with high root-zone N losses. The results demonstrate the value of using an N balance approach to evaluate the environmental effect of agricultural production on air and water quality, and to assess how this effect could be reduced through improved management practices.

14. **Effects of agricultural nutrient management on nitrogen fate and transport in Lancaster County, Pennsylvania.**
Hall, D. W. and Risser, D. W.
Water-resour-bull. 29: 1 pp.55-76. (Jan/Feb 1993).
NAL Call #: 292.9 Am34

Descriptors: nitrogen; nitrates; application-to-land; movement-in-soil; losses-from-soil; water-budget; precipitation; groundwater; manures; fertilizers; hydrology; groundwater-pollution; pennsylvania; best-management-practices; nonpoint-source-pollution; groundwater-hydrology
Abstract: Nitrogen inputs to, and outputs from, a 55-acre site in Lancaster County, Pennsylvania, were estimated to determine the pathways and relative magnitude of loads of nitrogen entering and leaving the site, and to compare the loads of nitrogen before and after the implementation of nutrient management. Inputs of nitrogen to the site were manure fertilizer, commercial fertilizer, nitrogen in precipitation, and nitrogen in ground-water inflow; and these sources averaged 93, 4, 2, and 1 percent of average annual nitrogen additions, respectively. Outputs of nitrogen from the site were nitrogen in harvested crops, loads of nitrogen in surface runoff, volatilization of nitrogen, and loads of nitrogen in ground-water discharge, which averaged 37, less than 1, 25,

and 38 percent of average annual nitrogen removals from the site, respectively. Virtually all of the nitrogen leaving the site that was not removed in harvested crops or by volatilization was discharged in the ground water. Applications of manure and fertilizer nitrogen to 47.5 acres of cropped fields decreased about 33 percent, from an average of 22,700 pounds per year (480 pounds per acre per year) before nutrient management to 15,175 pounds of nitrogen per year (320 pounds per acre per year) after the implementation of nutrient management practices. Nitrogen loads in ground-water discharged from the site decreased about 30 percent, from an average of 292 pounds of nitrogen per million gallons of ground water before nutrient management to an average of 203 pounds of nitrogen per million gallons as a result of the decreased manure and commercial fertilizer applications. Reductions in manure and commercial fertilizer applications caused a reduction of approximately 11,000 pounds (3,760 pounds per year; 70. 70 pounds per acre per year) in the load of nitrogen discharged in ground water from the 55-acre site during the three-year period 1987-1990.

15. **Effects of atmospheric ammonia on vegetation--a review.**
Fangmeier, A., Hadwiger Fangmeier, A., Eerden, L. van der., and Jager, H. J.
Environ-pollut. 86: 1 pp.43-82. (1994).
NAL Call #: QH545.A1E52

Descriptors: ammonia; air-pollutants; emission; atmosphere; vegetation; phytotoxicity; ammonium; deposition; uptake; ion-uptake; shoots; roots; biochemical-pathways; assimilation; abiotic-injuries; nitrogen-metabolism; gas-exchange; stress-factors; resistance; ecosystems; eutrophication; acidification; air-pollution

16. **Emissions of nitrous oxide from runoff-irrigated and rainfed soils in semiarid north-west Kenya.**
Wulf, S., Lehmann, J., and Zech, W.
Agric-ecosyst-environ. 72: 2 pp.201-205. (Feb 4, 1999).
NAL Call #: S601.A34

Descriptors: fluvisols; nitrous-oxide; emission; runoff; irrigation; rain; semiarid-zones; soil-water-content; nitrate; soil-fertility; carbon; nitrification; kenya
Abstract: Nitrous oxide is an important greenhouse gas and contributes to stratospheric ozone destruction, but still little is known about emissions of this trace gas from soils in semiarid environments and how emissions are affected by irrigation. Therefore, nitrous oxide emissions from a runoff-irrigated and rainfed endosodi-calcaric Fluvisol in the semiarid northwest of Kenya were measured using the closed chamber method. Corresponding soil moisture and nitrate contents were determined. Nitrous oxide emissions were highly correlated with soil moisture ($r = 0.73$, $p < 0.001$). The wetting of dry soil by precipitation or irrigation resulted in high emission rates of up to 0.3 g N2O-N ha-1 h-1. Due to excess soil moisture these rates were lower on the runoff-irrigated plots than on the rainfed ones, but decreased at an lower rate with time. Cumulative emissions for a 1-month period were similar for both treatments (55-65 g N2O-N ha-1). The methods applied did not allow a distinction between different sources of N2O, but considering low C and N contents of the soil and high emission rates at times of low soil nitrate content, nitrification seems to be the dominating process for the emissions observed.

17. **Enantioselective fate of chiral chlorinated hydrocarbons and their metabolites in environmental samples.**
Vetter, W.
Food-rev-int. 17: 2 pp.113-182. (2001).
NAL Call #: TX341.F662

Descriptors: chlorinated-hydrocarbons; organochlorine-pesticides; metabolites; pesticide-residues; enantiomers; stereochemistry; separation; gas-chromatography; mass-spectrometry; air-pollution; water-pollution; soil-pollution; literature-reviews

18. **Environmental impact of pig meat production.**
Backus, G. B. C., Wagenberg, C. P. A. van., and Verdoes, N.
Meat-sci. 49: suppl. pp.S65-S72. (1998).
NAL Call #: TX373.M4

Descriptors: pig-farming; finishing; environmental-impact; pig-manure; nitrogen; phosphate; excretion; application-to-land; ammonia; emission; air-pollution; pollution-control; pig-slurry; nitrate; leaching; groundwater-pollution; netherlands

19. **An environmental simulation model for transport and fate of mercury in small rural catchments.**
Tsiros, I. X. and Ambrose, R. B.
Chemosphere. 39: 3 pp.477-492. (Aug 1999).
NAL Call #: TD172.C54

Descriptors: agricultural-soils; organic-soils; watersheds; mercury; methylmercury; soil-pollution; polluted-soils; volatilization; simulation-models; transport-processes; rural-areas; soil-profiles; runoff; air-pollution; deposition; biogeochemistry; reduction; methylation; chemical-reactions; florida; demethylation; south-florida-everglades

20. **Evaluating the environmental fate of atrazine in France.**
Bintein, S. and Devillers, J.
Chemosphere. 32: 12 pp.2441-2456. (June 1996).
NAL Call #: TD172.C54

Descriptors: atrazine; herbicide-residues; contamination; environment; simulation-models; computer-simulation; soil-pollution; water-pollution; groundwater-pollution; biodegradation; food-chains; biota; air-pollution; france; chemfrance

21. **Food production and consumption in Germany: N flows and N emissions.**
Isermann, K. and Isermann, R.
Nutr-cycl-agroecosyst. 52: 2/3 pp.289-301. (Oct 1998).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: food-production; food-consumption; nitrogen-cycle; emission; nitrous-oxide; sustainability; pollution-control; agriculture; biomass-production; water-pollution; air-pollution; waste-water-treatment; acidification; eutrophication; stocking-rate; livestock; production; mineralization; nitrogen; immobilization; efficiency; germany

Abstract: During the past four decades the authors perceive that an increasing non-sustainability (Disintegration) within the agriculture, human nutrition, waste management complex has occurred both in Germany and the European Union. Compared to the basic needs of the population for nutritive energy, fat and protein, we estimate that the production and consumption of food and feed is more than 50% higher than necessary. Using nitrogen (N) input into German agriculture in 1991/92 as an example, we estimated that the N input of 191 kg ha-1 was 2 to 3 times too high. This high N input resulted in the net biomass production of 45 kg ha-1, a 25% efficiency. This inefficiency causes emissions of reactive N and other nutrient compounds into the hydrosphere and atmosphere that were 2 to 8 times too high. For example the contributions of agriculture to the total annual N2O-N emissions of Germany (during 1990-1992), Europe (1990) and of the world (1989) were 110, 691 Gg and 6.7 Tg or 52, 62 and 41%, respectively. The authors demonstrate that emissions of N and P from Germany and EU waste water management systems are also higher than necessary because nutrient recycling is not practiced extensively. Excessive food production and consumption has made the agriculture/human nutrition/waste and waste water complex, like the energy/transportation complex, a main cause of new transboundary environmental damage such as soil and water acidification, hypertrophication of near-natural terrestrial and aquatic ecosystems and climate change. We propose that a sustainable food production/consumption system can be developed that is based both on need-oriented production and consumption with no net exports and on recovery, recycling and more. efficient use of nutrients. Using N as an example, the authors show which short and long term action aims must be set and realized by the year 2015, to meet environmental, economical and social sustainability requisites. The suggested, assumed sustainable N balance for German agriculture is characterized by a critical annual input and surplus maximum of 80 and 45 kg N ha-1 respectively, which should almost double biomass production efficiency for N utilization. This estimate is based on reducing animal stocking rates to 0.5 gross weight unit ha-1 to attain no net mineralization or immobilization of N in the soil.

22. **The impact of humans on the nitrogen cycle, with focus on temperate arable agriculture.**
Jenkinson, D. S.
Plant-soil. 228: 1 pp.3-15. (Jan 2001).
NAL Call #: 450 P696

Descriptors: man; environmental-impact; nitrogen-cycle; agriculture; temperate-zones; arable-farming; nitrogen-fertilizers; leaching; nutrient-requirements; nitrate; nitrogen-fixation; water-pollution; surface-water; ammonia; nitrous-oxide; nitric-oxide; nitrogen-dioxide; eutrophication; emission

23. **The impact of nitrogen deposition on upland surface waters in Great Britain.**
Allott, T. E. H., Curtis, C. J., Hall, J., Harriman, R., and Battarbee, R. W.
Water-air-soil-pollut. 85: 2 pp.297-302. (Dec 1995).
NAL Call #: TD172.W36

Descriptors: acid-deposition; air-pollution; nitrogen; nitrate; leaching; watersheds; land-types; soil-chemistry; vegetation-types; water-quality; surface-water; upland-areas; geographical-distribution; great-britain

24. **Impacts of water and air quality legislation on the poultry industry.**
Morse, D.
Poultry-sci. 75: 7 pp.857-861. (July 1996).
NAL Call #: 47.8 Am33P

Descriptors: regulations; environmental-legislation; water-quality; air-quality; livestock-numbers; turkeys; hens; broilers; ducks; application-to-land; application-rates; ozone; ammonia; usa
Abstract: Poultry operators are faced with continually changing water and air quality regulations that may influence management decisions and economic viability. Informed extension, research and allied industry members may be able to respond to industry needs to develop research and disseminate findings. Implications of Reauthorization of the Coastal Zone Management Act and its potential impact on the next version of the Clean Water Act are presented. Also presented are air quality concerns related to ozone and particulate matter formation.

25. **An indicator of pesticide environmental impact based on a fuzzy expert system.**
Werf, H. M. G. van der. and Zimmer, C.
Chemosphere. 36: 10 pp.2225-2249. (Apr 1998).
NAL Call #: TD172.C54

Descriptors: pesticide-residues; environmental-impact; fuzzy-logic; expert-systems; groundwater-pollution; water-pollution; air-pollution; risk-assessment; leaching; runoff; volatilization; toxicity; man; application-methods; ipest-expert-system

26. **Landscape fate of nitrate fluxes and emissions in Central Europe.**
Haag, D. and Kaupenjohann, M.
Agric-ecosyst-environ. 86: 1 pp.1-21. (July 2001).
NAL Call #: S601.A34

Descriptors: landscape; nitrate; emission; simulation-models; nitrogen-cycle; agriculture; ecosystems; movement-in-soil; streams; metabolism; ecotones; drainage; riparian-vegetation; quantitative-analysis; spatial-variation; denitrification; nitrous-oxide; literature-reviews; central-europe
Abstract: Agroecosystems are leaky systems emitting nutrients like nitrate, which affect ecosystems on a range of scales. This paper examines the fate of nitrate on the landscape level focussing on how landscape components either facilitate or impede N translocation from the field to the stream (headwater). According to their role in landscape metabolism, two categories of landscape components are distinguished, ecotones/retention compartments and conduits/corridors. Conduits such as macropores, preferential interflow-paths, drainage tiles and streams rapidly relocate nitrate to headwaters. Retention compartments like the capillary fringe/saturated zone and riparian vegetation eliminate N through denitrification. The differential role of compartments is illustrated with quantitative examples from the literature. On the

landscape level retention potential for N is spatially variable and quantitatively limited, while its realisation is uncertain. Notwithstanding, the literature indicates that on a watershed basis the bulk of total N input is retained; thus the potential is discussed for the retention of nitrate on different scales, i.e. the field, landscape, regional and global scale. The transitory retention of excess nitrate in soil and subsoil solution, soil organic matter, groundwater and riparian vegetation may delay nitrate discharge to the aquatic system for decades, contributing to the low emission factors on basin scale. The adverse effects arising from denitrification are discussed, presenting data on the emission of nitrous oxide from the entirety of the different landscape compartments. It is concluded that reliance on landscape metabolism and self-purification postpones. the problem of global N overload and partially transfers it to the atmosphere. An assessment scheme is presented which in the face of the unpredictability of ecosystem and landscape behaviour is risk oriented (instead of impact oriented). The scheme uses a budget approach, which accounts for the critical role of corridors and considers the scale and scope of N emissions. A conceptual framework for the remediation of N overload is presented which rests on the realisation of cycling principles and zero-emission approaches on all scales of agricultural production and which pleads for regional approaches that transcend sectoral boundaries and take account of overall regional N fluxes.

27. **Nitric and nitrous oxide emissions and soil nitrate distribution in a center-pivot-irrigated cornfield.**
Guenzi, W. D., Hutchinson, G. L., and Beard, W. E.
J-environ-qual. 23: 3 pp.483-487. (May/June 1994).
NAL Call #: QH540.J6

Descriptors: nitric-oxide; nitrous-oxide; emission; nitrate-nitrogen; ammonium-nitrogen; spatial-distribution; losses-from-soil; leaching; center-pivot-irrigation; irrigation-systems; furrows; zea-mays; irrigated-conditions; frequency; groundwater-pollution; air-pollution; silt-loam-soils; colorado; low-energy-precision-application
Abstract: Research on soil N loss mechanisms remains a high priority not only because of the need to increase agricultural N use efficiency, but also because of environmental concerns such as NO3(-) contamination of groundwater and increasing N oxide concentrations in the atmosphere. We measured NO and N2O emissions and downward movement of NO3(-) in an eastern Colorado corn (Zea mays L.) field irrigated with a modified center-pivot system that applied water to alternate furrows One hour after infiltration of the irrigation water, emission rates measured by an enclosure method ranged from 0 to 6 g N ha-1 d-1 for NO and 0 to 26 g N ha-1 d-1 for N2O. The emission rates were largest after the first irrigation and much smaller following subsequent irrigations. Greater N oxide evolution from nonirrigated furrows than adjacent irrigated furrows probably resulted from lateral transport of gases produced in the wet soil. Analyses of soil cores taken after planting and after harvest provided no evidence that NO3(-) moved below the root zone during the growing season, despite the presence of substantially more inorganic N than required for maximum corn yield. These data suggest that when the size and frequency of irrigations are efficiently managed, use of a low energy precision application (LEPA) irrigation system results in no N loss to groundwater and no economically significant gaseous N oxide loss to the atmosphere.

28. **Nitrogen and phosphorus management on Dutch dairy farms.**
Neeteson, J. J.
Biol-fertil-soils. 30: 5/6 pp.566-572. (2000).
NAL Call #: QH84.8.B46

Descriptors: pollution-control; dairy-farms; cattle-manure; application-to-land; spreading; agricultural-land; application-date; storage; emission; control; environmental-legislation; regulations; nitrogen; phosphorus; nitrate; leaching; farm-inputs; grasslands; arable-land; sandy-soils; groundwater-pollution; netherlands; nutrient-management-legislation
Abstract: The high input of nutrients through the use of fertilizers, manure and animal feed make it possible to reach high levels of agricultural production. However, high nutrient inputs may also result in large nutrient losses and thus have adverse effects on groundwater, surface water, and the atmosphere. To minimize nutrient emissions from agriculture, the Dutch government has introduced regulations on nutrient use. These include: (1) a ban on spreading animal manure on agricultural land during the winter, (2) the obligation to cover storage facilities for animal manure, (3) compulsory low-emission applications of animal manure to land, and (4) applying levies when the maximum permissible annual N and P surpluses for farms are exceeded. The nutrient surplus is the difference between nutrient input into the farm and nutrient output from the farm. The maximum permissible N surpluses for 2000 are 250 kg N ha-1 year-1 and 125 kg N ha-1 year-1 for grassland and arable land, respectively, and for P, 35 kg P2O5 ha-1 year-1 for both grassland and arable land. When the annual permissible levels are exceeded, farmers are charged with a levy. Results obtained at the experimental dairy farm "De Marke" showed that a reduction in nutrient inputs via fertilizers and purchased food, in combination with restricted grazing, reduced the N surplus in such a way that the NO3(-) concentration in the groundwater decreased to about the maximum permissible level of 50 mg NO3(-) l-1. Since these results were obtained on a sandy soil that is very sensitive to NO3(-) leaching, it is suggested that all dairy farmers should be able to sufficiently reduce NO3(-) leaching by improving their farm management.

29. **Nitrogen budget for fescue pastures fertilized with broiler litter in Major Land Resource Areas of the southeastern US.**
Marshall, S. B., Mullen, M. D., Cabrera, M. L., Wood, C. W., Braun, L. C., and Guertal, E. A.
Nutr-cycl-agroecosyst. Dordrecht, The Netherlands ; Boston: Kluwer, c1996-. Jan 2001. v.59 (1) p. 75-83.
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: festuca-arundinacea; pastures; denitrification; leaching; nitrogen; nutrient-uptake; plant-nutrition; application-rates; ammonia; volatilization; emission; groundwater; environmental-impact; georgia; alabama; tennessee

30. **Nitrogen consumption, utilisation and losses in pig production in France, the Netherlands and Denmark.**
Dourmad, J. Y., Seve, B., Latimier, P., Boisen, S., Fernandez, J., Peet Schwering, C. van der., and Jongbloed, A. W.

Livest-prod-sci. 58: 3 pp.261-264. (Apr 30, 1999).
NAL Call #: SF1.L5

Descriptors: pigs; pig-farming; nitrogen; nutrient-uptake; nutrient-intake; waste-disposal; water-pollution; air-pollution; ammonia; geographical-variation; excretion; application-rates; feces; urine; protein-digestibility; amino-acids; nutrient-requirements; sows; feeds; literature-reviews; france; netherlands; denmark

31. **Nitrogen deposition and its contribution to nitrogen cycling and associated soil processes.**
Goulding, K. W. T., Bailey, N. J., Bradbury, N. J., Hargreaves, P., Howe, M., Murphy, D. V., Poulton, P. R., and Willison, T. W.
New-phytol. 139: 1 pp.49-58. (May 1998).
NAL Call #: 450 N42

Descriptors: nitrogen-cycle; nitrogen; deposition; nitrogen-fixation; ecosystems; eutrophication; precipitation; nitrate; ammonium; nitrogen-dioxide; acidification; wind; seasonal-variation; air-pollution; nitric-acid; ammonia; simulation; simulation-models; use-efficiency; nitrogen-fertilizers; application-rates; species; nitrification; isotope-labeling; literature-reviews; south-east-england

32. **Nitrogen deposition and strategies for the control of acidification and eutrophication across Great Britain.**
Metcalfe, S. E., Derwent, R. G., Whyatt, J. D., and Dyke, H.
Water-air-soil-pollut. 107: 1/4 pp.121-145. (Oct 1998).
NAL Call #: TD172.W36

Descriptors: air-pollution; nitrogen; sulfur-dioxide; deposition; ammonia; nitrogen-oxides; ammonium; pollution-control; emission; simulation-models; mathematical-models; geographical-variation; acidification; acid-deposition; eutrophication; soil-pollution; great-britain; harm-model; hull-acid-rain-model

33. **Nitrogen inputs to rivers, estuaries and continental shelves and related nitrous oxide emissions in 1990 and 2050: a global model.**
Kroeze, C. and Seitzinger, S. P.
Nutr-cycl-agroecosyst. 52: 2/3 pp.195-212. (Oct 1998).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: rivers; estuaries; ecosystems; nitrogen; deposition; nitrous-oxide; emission; prediction; mathematical-models; watersheds; nitrogen-cycle; geographical-distribution; soil-biology; nitrification; denitrification
Abstract: The purpose of the current paper is to estimate future trends (up to the year 2050) in the global geographical distribution of nitrous oxide (N2O) emissions in rivers, estuaries, and continental shelf regions due to biological processes, particularly as they are affected by anthropogenic nitrogen (N) inputs, and to compare these to 1990 emissions. The methodology

used is from Seitzinger and Kroeze (1998) who estimated 1990 emissions assuming that N2O production in these systems is related to nitrification and denitrification. Nitrification and denitrification in rivers and estuaries were related to external inputs of nitrogen to those systems. The model results indicate that between 1990 and 2050 the dissolved inorganic nitrogen (DIN) export by rivers more than doubles to 47.2 Tg N in 2050. This increase results from a growing world population, associated with increases in fertilizer use and atmospheric deposition of nitrogen oxides (NOy). By 2050, 90% of river DIN export can be considered anthropogenic. N2O emissions from rivers, estuaries and continental shelves are calculated to amount to 4.9 (1.3-13.0) Tg N in 2050, of which two-thirds are from rivers. Aquatic emissions of N2O are calculated to increase faster than DIN export rates: between 1990 and 2050, estuarine and river emissions increase by a factor of 3 and 4, respectively. Emissions from continental shelves, on the other hand, are calculated to increase by only 12.5%.

34. **The nitrogen load to the Baltic Sea: present situation, acceptable future load and suggested source reduction.**
Enell, M. and Fejes, J.
Water-air-soil-pollut. 85: 2 pp.877-882. (Dec 1995).
NAL Call #: TD172.W36

Descriptors: water-pollution; nitrogen; runoff; agricultural-land; emission; air-pollution; deposition; watersheds; pollution-control; agriculture; forestry; baltic-sea; scandinavia; russia; baltic-states; germany; poland; baltic-sea-drainage-basin

35. **Nitrogen loading from watersheds to estuaries: verification of the Waquoit Bay Nitrogen Loading Model.**
Valiela, I., Geist, M., McClelland, J., and Tomasky, G.
Biogeochemistry. 49: 3 pp.277-293. (June 2000).
NAL Call #: QH345.B564

Descriptors: nitrogen-fertilizers; water-pollution; runoff; air-pollution; air-pollutants; massachusetts

36. **Nitrogen mobilization in Asia.**
Galloway, J. N.
Nutr-cycl-agroecosyst. 57: 1 pp.1-12. (May 2000).
NAL Call #: S631.F422

Descriptors: nitrogen-cycle; mobilization; ammonia; food; fertilizers; climatic-change; acid-rain; deposition; air-pollutants; ozone; eutrophication; ecosystems; biogeochemistry; population-growth; population-density; literature-reviews

37. **Nitrous oxide flux from poultry-manured erosion plots and grass filters after simulated rain.**
Coyne, M. S., Gilfillen, R. A., and Blevins, R. L.
J-environ-qual. 23: 4 pp.831-834. (July/Aug 1994).
NAL Call #: QH540.J6

Descriptors: nitrous-oxide; emission; rain; simulation; agricultural-soils; poultry-manure; nitrate-nitrogen; runoff; greenhouse-gas
Abstract: Adding carbon-rich materials to fields, like manure, may enhance denitrification. Grass filters, which are used to trap surface runoff from these fields, may also provide a carbon-rich environment that favors water infiltration and denitrification. Nitrous oxide (N2O) may be evolved in these settings. It is a radiatively important trace gas and intermediate in the denitrification pathway and several other microbial processes. We measured N2O flux, after simulated rain, using a soil cover technique in poultry-manured plots and grass filters receiving their runoff. Intact soil cores were used to relate the N2O flux to the denitrification potential of the plots. Nitrous oxide fluxes were smaller in grass filters than in manured plots, even though more denitrifying bacteria were present. The average N2O flux in the three most dynamic erosion plots was 755 micrograms N2O-N m-2 h-1, which was 39% of the maximal denitrification rate measured in acetylene-blocked, NO(3-) -amended soil cores. Nitrous oxide flux immediately after rainfall was greater than N2O flux measurements reported for similar agricultural settings.

38. **Nitrous oxide production in riparian zones and groundwater.**
Groffman, P. M., Gold, A. J., and Jacinthe, P. A.
Nutr-cycl-agroecosyst. 52: 2/3 pp.179-186. (Oct 1998).
URL: http://www.wkap.nl/kapis/CGI-BIN/WORLD/jrnltoc.htm?1385-1314
NAL Call #: S631.F422

Descriptors: riparian-forests; rivers; groundwater; nitrous-oxide; biosynthesis; emission; denitrification; nitrogen-cycle; soil-flora; microbial-flora; estimation; mathematical-models
Abstract: This paper addresses the question of whether riparian zones and groundwater are 'hotspots' of nitrous oxide (N2O) flux in the landscape. First, we describe how riparian zones and groundwater function as transformers of N, with a particular emphasis on mechanisms of N2O production in these ecosystems. We then present specific data on N2O flux in these ecosystems and attempt to reconcile these data with existing regional scale estimates of N flux for Norway and with estimates of N2O flux for Norway produced using the OECD/IPCC/IEA Phase II methodology for calculation of regional and global N2O budgets. While the OECD/IPCC/IEA approach produces estimates of riparian and groundwater N2O flux that are reasonable, given what we know about regional scale N balances and actual data on N2O flux, it does not allow us to determine if riparian zones and groundwater are 'hotspots' of N2O production in the landscape. The approach fails to answer this question because it is unable to account for spatially explicit phenomena such as riparian and groundwater processing of excess agricultural N. Research needs that would allow us to address this question are discussed.

39. **Nutrient balance on Nebraska livestock confinement systems.**
Koelsch, R. and Lesoing, G.
J-anim-sci. 77: suppl.2 pp.63-71. (1999).
NAL Call #: 49 J82

Descriptors: cattle-manure; pig-manure; livestock-numbers; stocking-rate; nitrogen-balance; phosphorus; feedlots; mixed-farming; livestock-enterprises; waste-disposal; waste-utilization; acreage; crops; air-pollution; water-pollution; farm-size; nebraska

Abstract: Managing the environmental risk associated with livestock production is a significant challenge. Nitrogen and phosphorus are commonly implicated as the sources of ground and surface water quality problems associated with livestock production. The degree of imbalance between these nutrient inputs and the managed nutrient outputs for a livestock operation defines the magnitude of potential environmental risk and provides insight as to the underlying causes of these challenges. A nitrogen and phosphorus balance was constructed for 33 Nebraska confinement livestock operations. Twenty-five and 17 of these operations experienced significant nitrogen and phosphorus imbalances, respectively (50% more nutrient inputs than outputs). Nutrient inputs on many livestock operations were observed to be two to four times greater than nutrient outputs as managed crop and livestock products. Size of the livestock operation and the degree of integration of livestock with a cropping operation provided only limited explanation of the variation in nutrient balance observed among the individual operations. Management options that contribute to a more favorable nutrient balance were also identified. Management decisions related to feeding program and exporting of manure nutrients to off-farm users were observed to have a substantial impact on the nutrient imbalance. For modern livestock production systems to successfully respond to nutrient-related environmental problems, management strategies must be implemented that address the commonly experienced imbalances of nitrogen and phosphorus.

40. **Nutrient mass balance for the Albemarle-Pamlico Drainage Basin, North Carolina and Virginia, 1990.**
McMahon, G. and Woodside, M. D.
J-Am-Water-Resour-Assoc. 33: 3 pp.573-589. (June 1997).
NAL Call #: GB651.W315

Descriptors: drainage-systems; watersheds; water-pollution; water-quality; nitrogen; phosphorus; atmosphere; deposition; animal-wastes; fertilizers; nitrogen-fixation; point-sources; agriculture; forests; urban-areas; north-carolina; virginia; albemarle-pamlico-national-stream-quality-accounting-network; nonpoint-source-pollution; nutrient-inputs; nutrient-outputs; nutrient-flux; atmospheric-deposition
Abstract: A 1990 nitrogen and phosphorus mass balance calculated for eight National Stream Quality Accounting Network (NASQAN) basins in the Albemarle-Pamlico Drainage Basin indicated the importance of agricultural nonpoint sources of nitrogen and phosphorus and watershed nitrogen retention and processing capabilities. Basin total nitrogen and phosphorus input estimates were calculated for atmospheric deposition (which averaged 27 percent of total nitrogen inputs and 22 percent of total phosphorus inputs); crop fertilizer (27 and 25 percent); animal-waste (22 and 50 percent, respectively); point sources (3 percent each of total nitrogen and total phosphorus inputs); and biological nitrogen fixation (21 percent of total nitrogen inputs). Highest in-stream nitrogen and phosphorus loads were measured in predominantly agricultural drainage areas. Intermediate loads were observed in mixed agricultural/urban drainage areas; the lowest loads were measured in mixed agricultural/forested drainage areas. The difference between the sum of the nutrient input categories and the sum of the in-stream nutrient loads and crop-harvest nutrient removal was assigned to a residual category for the basin. The residual category averaged 51 percent of total nitrogen inputs and 54 percent of total phosphorus inputs.

41. **Optimizing livestock manure applications to reduce nitrate and ammonia pollution.**
Webb, J., Henderson, D., and Anthony, S. G.
Soil-use-manage. 17: 3 pp.188-194. (Sept 2001).
NAL Call #: S590.S68

Descriptors: manures; cattle-manure; application-rates; nitrate; ammonia; simulation-models; incorporation; leaching; groundwater-pollution; nitrous-oxide; soil-injection; slurries; seasonal-variation; pollution-control; air-pollution; water-pollution; england
Abstract: Measures to reduce ammonia (NH3) emissions by incorporating livestock manures into the soil may increase the potential for nitrate (NO3-) leaching. The Manure Evaluation Routine (MANNER) model estimates the amount of N available to crops following livestock manure applications after calculating losses due to NH3 volatilization and NO3- leaching. The main objective of this study was to use the MANNER model to quantify the impact on NO3- leaching of introducing measures to reduce NH3 emissions, following application of livestock manures. The data produced were also used to make preliminary estimates of the likely effect of selected NH3 abatement techniques on the potential for nitrous oxide (N2O) emissions. At typical UK rates of application, the potential for increased NO3- leaching following either injection of slurry or rapid incorporation of solid manures was greatest for broiler/turkey manure (22-58 kg N ha(-1)) and least for straw-based cattle manure (6-10 kg N ha(-1)). The results suggest that in order to avoid substantially increasing the potential for NO3- leaching as a consequence of NH3 abatement, livestock manures should not be applied by low NH3 emission techniques prior to autumn-sown crops in the UK. Instead, low-emission applications should be made from October onwards to grassland and where possible, late autumn-sown combinable crops or to arable land which will be planted in the spring. However, in several areas of England and Wales there is currently insufficient land planted to spring crops on which to incorporate the livestock manures produced in those areas.

42. **An overview of the environmental impact of agriculture in the U.K.**
Skinner, J. A., Lewis, K. A., Bardon, K. S., Tucker, P., Catt, J. A., and Chambers, B. J.
J-environ-manage. 50: 2 pp.111-128. (June 1997).
NAL Call #: HC75.E5J6

Descriptors: agriculture; environmental-impact; pesticides; animal-wastes; ammonia; nitrates; erosion; losses-from-soil; odor-emission; water-pollution; human-ecology; flora; fauna; biodiversity; oxygen-requirement; environmental-management; uk

43. **Pesticides in Chesapeake Bay, atmosphere, and surface waters.**
McConnell, L. L., Nelson, E., Rice, C. P., Harman, J. A., Baker, J. E., Johnson, W. E., and Chernyak, S. M.
Clean water, clean environment, 21st century team agriculture, working to protect water resources conference proceedings, March 5-8, 1995, Kansas City, Missouri. St. Joseph, Mich.: ASAE, c1995.. v. 1 p. 129-132.
NAL Call #: TD365.C54-1995

Descriptors: pesticides; herbicides; pesticide-residues; herbicide-residues; estuaries; water-pollution; runoff-water; drainage; watersheds; air-pollution; deposition; volatilization; losses-from-soil; surface-water; insecticides; insecticide-residues; maryland; virginia; pennsylvania; west-virginia

44. **Pesticides in Chesapeake Bay: historical perspective and role of the surface microlayer.**
Johnson, W. E., Plimmer, J. R., McConnell, L. L., Rice, C. P., Kroll, R. B., Pait, A. S., and Bialek, K.
Clean water, clean environment, 21st century team agriculture, working to protect water resources conference proceedings, March 5-8, 1995, Kansas City, Missouri. St. Joseph, Mich.: ASAE, c1995.. v. 1 p. 101-104.
NAL Call #: TD365.C54 1995

Descriptors: pesticides; pesticide-residues; herbicides; herbicide-residues; losses-from-soil; runoff; runoff-water; volatilization; deposition; estuaries; water-pollution; surface-water; photolysis; atrazine; metolachlor; water-quality; nitrate; organic-matter; virginia; maryland; pennsylvania; west-virginia; dissolved-organic-matter

45. **Pesticides in precipitation: implications for water quality monitoring.**
Nations, B. K., Hallberg, G. R., Libra, R. D., Kanwar, R. S., and Alexander, E. C. Jr.
Agricultural research to protect water quality proceedings of the conference February 21-24, 1993 Minneapolis, Minnesota, USA. Ankeny, IA: The Society, [1993]. p. 142-145.
NAL Call #: TD427.A35A49 1993

Descriptors: surface-water; groundwater; water-pollution; pesticides; precipitation; water-quality; water-management; iowa

46. **Pesticides in precipitation in northern Germany.**
Siebers, J., Gottschild, D., and Nolting, H. G.
Chemosphere. 28: 8 pp.1559-1570. (Mar 1994).
NAL Call #: TD172.C54

Descriptors: herbicide-residues; insecticide-residues; fungicide-residues; rain; air-pollution; water-pollution; lower-saxony

47. **Pesticides in rain.**
Huskes, R. and Levsen, K.
Chemosphere. 35: 12 pp.3013-3024. (Dec 1997).
NAL Call #: TD172.C54

Descriptors: rain; pesticide-residues; air-pollution; water-pollution; seasonal-variation; lower-saxony

48. **Pesticides in the atmosphere: current understanding of distribution and major influences.**
Geological Survey (U.S.). Sacramento, CA: USGS, [1995?].
URL: http://ca.water.usgs.gov/pnsp/atmos/
NAL Call #: TD887.P45P47 1995

Descriptors: Pesticides-Environmental-aspects-United-States; Air-Pollution-United-States; Atmospheric-deposition-United-States; Water-Pollution-United-States

49. **Poultry manure management: environmentally sound options.**
Moore, P. A. Jr., Daniel, T. C., Sharpley, A. N., and Wood, C. W.
J-soil-water-conserv. 50: 3 pp.321-327. (May/June 1995).
NAL Call #: 56.8 J822

Descriptors: poultry-manure; waste-utilization; uses; application-to-land; management; environmental-protection; phosphorus; nitrogen; point-sources; water-pollution; water-quality; air-quality; soil-properties; soil-fertility; arkansas; alabama; oklahoma; best-management-practices; nonpoint-source-pollution

50. **Practicalities, costs and effectiveness of a floating plastic cover to reduce ammonia emissions from a pig slurry lagoon.**
Scotford, I. M. and Williams, A. G.
J-agric-eng-res. London ; Orlando: Academic Press, 1956-. Nov 2001. v. 80 pp.3 (p. 273-281. 2001).
NAL Call #: 58.8 J82

Descriptors: ammonia-. emission-. pig-slurry. polyethylene-film. lagoons-. costs-. water-pollution. pollution-control. animal-production.
Abstract: The objectives of this research were to assess the practicalities and costs of covering a lagoon of pig slurry, with a maximum slurry surface area of 525 m2. The lagoon was covered with 0.5 mm thick reinforced ultraviolet (UV) stabilized black, opaque polyethylene. During the covering operation, several practical difficulties were identified. Since the lagoon was full, it was difficult to estimate the size of the material required to cover the lagoon whilst ensuring sufficient space to allow the lagoon to fill and empty. The covering operation itself required a calm day and was very labour intensive. Covering lagoons larger than the one covered in this study may necessitate them to be empty, which is often not practical in commercial pig units. The total cost of covering the lagoon was 8400 pounds which equated to 16 pounds m-2 of slurry surface covered. If larger lagoons are covered, economies of scale come into effect and the material costs per unit area of slurry surface are likely to reduce, although the labour cost may increase. Ammonia emissions were measured from both an uncovered lagoon and covered lagoon. The ammonia emissions were measured using hoods, each covering a surface area of 0.5 m2. Each hood ws fitted with an inlet pipe and outlet pipe. Air ws forced into the hood using a 12 V fan which gave a superficial air velocity of 0.4 m s-1 across the measured surface. The ammonia flux was measured into and out of the hoods by Ferm tubes situated in the inlet and outlet pipes. The ammonia emission rates (corrected for wind speed) from the uncovered lagoon ranged from 0.63 to 3.66 g m-2 d-1. The floating plastic cover prevented nearly 100% of these emissions.

51. **Reducing nutrient losses on dairy farms in The Netherlands.**
Kuipers, A. and Mandersloot, F.
Livest-prod-sci. 61: 2/3 pp.139-144. (Oct 1999).
NAL Call #: SF1.L5

Descriptors: dairy-farms; nutrient-balance; land-management; groundwater; groundwater-pollution; nitrate; leaching; ammonia; volatilization; emission; phosphorus; cattle-manure; application-rates; feeds; concentrates; grazing; soil-injection; cattle-slurry; odors; netherlands

52. **Regional materials accounting of nitrogen in Upper Austria.**
Zessner, M., Kaas, T., Brunner, P. H., and Fleckseder, H.
Diffuse pollution '95 selected proceedings of the 2nd IAWQ International Specialized Conference and Symposia on Diffuse Pollution, held in Brno and Prague, Czech Republic, 13-18 August 1995. 1st ed. Oxford ; New York: Pergamon Press, 1996.. p. 89-97.
NAL Call #: TD420.A1P7 v.33 no.4/5

Descriptors: water-pollution; surface-water; nitrate; nitrate-nitrogen; ammonium; ammonium-nitrogen; runoff; agricultural-land; livestock-farming; volatilization; air-pollution; emission; animal-husbandry; animal-wastes; austria; nonpoint-source-pollution

53. **Relationships between land uses and rainwater quality in a southcentral Pennsylvania watershed.**
Shertzer, R. H., Hall, D. W., Steffy, S. A., and Kime, R. A.
J-Am-Water-Resour-Assoc. 34: 1 pp.13-26. (Feb 1998).
URL: http://www.awra.org/jawra/index.html
NAL Call #: GB651.W315

Descriptors: watersheds; water-quality; precipitation; acid-deposition; herbicides; nutrients; ion-balance; seasonality; land-use; volunteers; monitoring; pennsylvania; conodoguinet-creek-watershed; nonpoint-source-pollution; volunteer-citizen-monitoring
Abstract: Spatial and temporal variability in rainfall concentrations of nutrients, major ions, and herbicides was monitored at 7 locations in or near the Conodoguinet Creek watershed in southcentral Pennsylvania from 1991-1993. Results were used to (1) compare precipitation quality in forested, agricultural and urban areas, and (2) assess the practicality of using volunteer citizen monitoring in such a study. As indicated in previous studies, sulfate and nitrogen concentrations in precipitation were linked to sample pH. Concentrations of major ions in precipitation appeared to relate more to regional influences rather than local influences. However, concentrations of herbicides in precipitation may have been influenced by both regional and local use which caused compounds like atrazine, deethylatrazine, propazine, simazine, metolachlor, alachlor, ametryn, and prometon to be present in detectable concentrations in rainfall. Seasonality was evident in nitrogen, sulfate, pH, and herbicide data and was suggested in calcium, iron, manganese, magnesium, orthophosphate, and chloride data. Agricultural weed control activities were probably responsible for the seasonal pattern in pesticide data which peaked in May and June. Tropical storm Danielle may have caused the apparent seasonal patterns for the other nine parameters. This storm did not follow the typical west to east movement pattern and consequently produced rainfall of relative high quality. A variety of quality assurance checks indicated that trained volunteer citizen monitors were successful participants in this intensive and extensive scientific study, collecting good quality samples in a timely manner. Without this kind of volunteer help, it is. extremely difficult to complete studies that require sampling in response to natural events such as rainfall.

54. **Response of the Lake Clair Watershed (Duchesnay, Quebec) to changes in precipitation chemistry (1988-1994).**
Houle, D., Paquin, R., Camire, C., Ouimet, R., and Duchesne, L.
Can-j-for-res. Ottawa, National Research Council of Canada. Nov 1997. v. 27 (11) p. 1813-1821.
NAL Call #: SD13.C35

Descriptors: watersheds; precipitation; water-quality; chemical-composition; sulfate; calcium; sodium; ph; water-pollution; air-pollution; mineralization; desorption; sulfur; magnesium; alkalinity; ammonium; nitrate; temporal-variation; deposition; seasonal-variation; soil-temperature; dormancy; nutrient-uptake; weathering; potassium; quebec
Abstract: The chemistry of precipitation and of the lake's outlet (1988-1994) were measured at the Lake Clair Watershed (226 ha, 46 degrees 57' N, 71 degrees 40' W, 270-390 m above sea level), which is located 50 km northwest of Quebec City, Quebec, Canada. In wet precipitation. concentrations of SO4, Ca, and Na decreased from 1988 to 1994 whereas pH increased. In bulk precipitation, only Ca and Na decreased. The lake's outlet SO4 concentration decreased from 1988 to 1994, suggesting that the catchment rapidly responded to the changes in precipitation although a net SO4-S export was observed each year between 1988 and 1994 (4.2 kg(.)ha-1(.)year-1). The source of the excess S was apparently located within the soil and most likely originated from SO4 desorption or organic S mineralization. The reduction in SO4 concentration at the outlet was associated with decreases of Ca, Mg, and Na concentrations. However, pH and alkalinity did not show any trends. No trends in NO3 and NH4 concentrations were observed in precipitation or at the lake's outlet during the 1988-1994 period. A major part (90%) of the atmospheric N deposition (9.2 kg(.)ha-1(.)year-1) was retained within the catchment and most of the N export was observed during snowmelt when low soil temperature, high water fluxes, and tree dormancy limited significant N uptake within the catchment. Net base cation export from the catchment was 17.1, 3.7, 2.1, and 6.7 kg(.)ha-1(.)year-1 for Ca, Mg, K, and Na, respectively. A budget was constructed for Ca and Mg specifically for the soil profile that included input from bulk precipitation, net uptake from vegetation, output from the rooting zone, and weathering rate. This budget indicated. net losses of 4.9 and 0.8 kg(.)ha-1(.)year-1, respectively, for Ca and Mg. Given the size of the exchangeable Ca (200 kg(.)ha-1) and Mg (27 kg(.)ha-1) reservoirs present within the soil profile, these results suggest that forest productivity may be affected in the very near future.

55. **Risk-based decision analysis of atmospheric emission alternatives to reduce ground water degradation on the European scale.**
Wladis, D., Rosen, L., and Kros, H.
Ground-water. 37: 6 pp.818-826. (Nov/Dec 1999).
NAL Call #: TD403.G7

Descriptors: groundwater-pollution; contamination; nitrate; aluminum; sulfur-dioxide; leaching; nitrogen-oxides; ammonia; pollution-control; air-pollution; emission; air-pollutants; decision-analysis; water-quality; computer-simulation; cost-benefit-analysis; soil-chemistry; transport-processes; risk-assessment; netherlands; smart2-model; risk-cost-benefit-maximization-model
Abstract: Environmental degradation due to emissions of sulfur dioxide, nitrate oxides, and ammonia from diffuse sources amounts to substantial costs to society and so do the alternatives

to protect and restore the environment. Damage to ground water includes acidification, aluminum leaching, elevated concentrations of nitrate, and eutrophication. Monetary risk-based decision analysis (on a national scale) is applied to compare alternative actions designed to protect ground water from further degradation. This decision analysis uses simulations of nitrate and aluminum concentrations over a 15 year period with two reduction scenarios for sulfur dioxide, nitrate oxides, and ammonia, and results in estimates of economic uncertainty. For each alternative, an objective function is estimated including the implementation costs, the economic risk associated with failure according to the selected decision criteria, and the economic benefits related to the implementation. The decision criteria are based on the European Community drinking water quality standards for nitrate and aluminum. The study aims at incorporating the hydrogeologic uncertainty resulting from the propagation of errors from data input to model output. A range of economic values has been applied to the ground water resource to study the sensitivity of the decision analysis to valuing ground water. The results indicate that higher reduction rates of the studied pollutants reduce the economic uncertainty but also lead to larger total costs. The study also indicates that the economic uncertainty may be equal to the total cost provided by the objective function. The contamination level of nitrate is much more. responsive to the reduction scenarios than the aluminum concentration. For high, but not unrealistic, ground water valuing, the economic uncertainty makes the decision between the studied alternatives unclear.

56. **Spatial variability of methane, nitrous oxide, and carbon dioxide emissions from drained grasslands.**
Pol van Dasselaar, A. van der, Corre, W. J., Prieme, A., Klemedtsson, A. K., Weslien, P., Stein, A., Klemedtsson, L., and Oenema, O.
Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1998. v. 62 (3) p. 810-817.
NAL Call #: 56.9 So3

Descriptors: peat-soils; histosols; grassland-soils; drained-conditions; nitrous-oxide; methane; carbon-dioxide; emission; losses-from-soil; soil-variability; spatial-variation; temporal-variation; site-factors; biological-activity-in-soil; methane-production; oxidation; gas-production; identification; soil-water-content; nitrate-nitrogen; ammonium-nitrogen; nitrogen-content; groundwater-level; correlation; statistical-analysis; sweden; geostatistics; carbon-dioxide-production; methane-oxidation; nitrous-oxide-production
Abstract: Emissions of CH4, N2O, and CO2 from soils are the result of a number of biological and physical processes, each influenced by several environmental and management factors exhibiting spatial variability. This study aimed to assess the spatial variability and spatial dependence of CH4, N2O, and CO2 emissions and their underlying soil processes and properties from grasslands on drained peat soil (Terric Histosol). Emissions and possible controlling factors were measured at a field location in Sweden. Measurements were done on two adjacent sites on peat soil on two successive days for each site. Spatial variability was analyzed with trend analysis and variograms. Both sites consumed small amounts of atmospheric CH4, i.e., 0.03 and 0.05 mg CH4 m-2 d-1, and emitted N2O and CO2, i.e., 5 to 19 mg N2O m-2 d-1 and 4 to 6 g CO2 m-2 d-1. Spatial variability of emissions was high, with coefficients of variation of 50 to 1400%. Emissions either showed a spatial trend or were spatially dependent with ranges of spatial dependence of 50 to >200 m. However, spatial dependence of emissions showed

differences between sites and short-term temporal variability. Variograms of emissions and soil processes, which are partly biological in nature and have a high degree of inherent variability, should be interpreted with care.

57. **Spatiotemporal variability of wet atmospheric nitrogen deposition to the Neuse River estuary, North Carolina.**
Whitall, D. R. and Paerl, H. W.
J-environ-qual. 30: 5 pp.1508-1515. (Sept/Oct 2001).
NAL Call #: QH540.J6

Descriptors: nitrogen; deposition; spatial-variation; estuaries; water-pollution; north-carolina
Abstract: Excessive nitrogen (N) loading to N-sensitive waters such as the Neuse River estuary (North Carolina) has been shown to promote changes in microbial and algal community composition and function (harmful algal blooms), hypoxia and anoxia, and fish kills. Previous studies have estimated that wet atmospheric deposition of nitrogen (WAD-N), as deposition of dissolved inorganic nitrogen (DIN: NO3-, NH3/NH4+) and dissolved organic nitrogen, may contribute at least 15% of the total externally supplied or "new" N flux to the coastal waters of North Carolina. In a 3-yr study from June 1996 to June 1999, we calculated the weekly wet deposition of inorganic and organic N at eleven sites on a northwest southeast transect in the watershed. The annual mean total (wet DIN + wet organics) WAD-N flux for the Neuse River watershed was calculated to be 956 mg N/m2/yr (15026 Mg N/yr). Seasonally, the spring (March May) and summer (June August) months contain the highest total weekly N deposition; this pattern appears to be driven by N concentration in precipitation. There is also spatial variability in WAD-N deposition; in general, the upper portion of the watershed receives the lowest annual deposition and the middle portion of the watershed receives the highest deposition. Based on a range of watershed N retention and in-stream riverine processing values, we estimate that this flux contributes approximately 24% of the total "new" N flux to the estuary.

58. **Uniform System for the Evaluation of Substances. V. ESPE, risk assessment for pesticides.**
Linders, J. B. H. J. and Luttik, R.
Chemosphere. 31: 5 pp.3237-3248. (Sept 1995).
NAL Call #: TD172.C54

Descriptors: pesticides; pesticide-residues; water-pollution; health-hazards; risk; regulations; evaluation; decision-making; soil-pollution; air-pollution; simulation-models; netherlands; agricultural-pesticides; non-agricultural-pesticides

59. **Vulnerability to diffuse pollution and average nitrate contamination of European soils and groundwater.**
Meinardi, C. R., Beusen, A. H. W., Bollen, M. J. S., Klepper, O., and Willems, W. J.
Water-sci-technol. 31: 8 pp.159-165. (1995).
NAL Call #: TD420.A1P7

Descriptors: groundwater-pollution; risk; geographical-information-systems; air-pollution; nitrate; leaching; soil-pollution; land-types; groundwater-recharge; aquifers; water-quality; europe

60. **Whole-ecosystem nitrogen effects research in Europe.**
Sullivan, T. J.
Environ-Sci-Tech. 27: 8 pp.1482-1486. (Aug 1993).
NAL Call #: TD420.A1E5

Descriptors: air-pollution; nitrogen; inorganic-compounds; deposition; ecosystems; research; forest-ecology; surface-water; water-pollution; europe

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