Water Quality and Forestry (I)

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Water Quality Information Center

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An assessment of the ecological effects of acidic deposition.

Language: English

Descriptors: Water pollution; Acid deposition; Ecosystems; Surface water; Acidification; Fish; Wild birds; Responses; Forest damage; Crop damage

Benthic macroinvertebrate community structure in 20 streams of varying pH and humic content.

Language: English

Descriptors: Sweden; Aquatic insects; Insect communities; Species diversity; Streams; Ph; Humus; Humic acids; Water quality; Aluminum; Benthos; Coniferous forests; Community ecology; Freshwater ecology

Best management practices for forest road construction and harvesting operations in Oklahoma.

Language: English

Descriptors: Oklahoma; Water quality; Water conservation; Streams; Stream erosion; Forests; Roads; Road construction; Logging

Biogeochemistry of certain forested landscapes of different temperature regions.
Bazilevich, N.I.; Shitikova, T.Y.
Includes references.

Language: English; Russian

Descriptors: U.S.S.R. in Europe; South America; Forest soils; Boreal forests; Tropical rain forests; Forest steppe soils; Taiga soils; Biogeochemical cycles; Biological production; Water composition and quality; Mineral content; Nitrogen content; Chemical composition; Nutrient cycles; Nutrient balance; Ecosystems; Tropical zones; Temperate zones

5

NAL Call. No.: S544.3.A2C47
BMPs for stream crossings.
Lanford, B.L.; Burdette, D.

Language: English

Descriptors: Alabama; Streams; Water pollution; Riverbank protection; Forestry practices; Culverts; Bridges

6

NAL Call. No.: HC79.E5E5
Brazil's Balbina Dam: environment versus the legacy of the pharaohs in Amazonia.
Fearnside, P.M.

Language: English

Descriptors: Brazil; Tropical rain forests; Dams; Hydroelectric schemes; Environmental degradation; Program evaluation; Water pollution

7

NAL Call. No.: TD420.A1P7
Changes in the composition of the Danube River basin biocenosis resulting from anthropogenic influences.
Pujin, V.

Language: English

Descriptors: Europe; River water; Water pollution; River
basins; Biocenosis; Ecosystems; Flood plain forests and forestry; Flooded land; Eutrophication; Phytoplankton; Zooplankton; Benthos

Comparative impacts of forest harvest and acid precipitation on soil and streamwater acidity.
Hornbeck, J.W.

Language: English

Descriptors: New Hampshire; Acid rain; Acid deposition; Whole tree logging; Soil ph; Soil acidity; Forest soils; Coniferous forests; Watersheds; Weathering; Hydrogen ions; Acidification; Streams; Ph

A comparison of surface-grab and cross sectionally integrated stream-water-quality sampling methods.
Martin, G.R.; Smoot, J.L.; White, K.D.
Includes references.

Language: English

Descriptors: Kentucky; River water; Water quality; Sampling; Site types; Farmland; Forests

Cooperation and conflict in a federal-municipal watershed: a case study of Portland, Oregon.
Wilson, R.R.

Language: English

Descriptors: Washington; Forest management; Forest influences; Watersheds; Water supply; Water quality; Logging; Watershed management; Forest policy; Historical records

Costs of protecting water quality during harvesting on private forestlands in the southeast.
Lickwar, P.; Hickman, C.; Cubbage, F.W.
Language: English
Descriptors: Alabama; Florida; Georgia; Harvesting; Logging; Water quality; Protection; Resource conservation; Economic analysis; Costs

Abstract: Data on harvest volumes, topography, and other site and area characteristics were obtained from 22 timber harvests in Alabama, Florida, and Georgia. An economic analysis was then used to estimate the marginal costs of implementing each state's recommended Best Management Practices (BMPs), as well as a set of enhanced BMPs on these sites. Considering all of the areas combined, the costs of using the recommended BMPs averaged 2.9% of gross timber sale revenue, $2.34 per thousand board feet (mbf) of timber harvested, or $12.45/ac. The cost of implementing the enhanced BMPs averaged 5.1% of gross stumpage value, $4.13/mbf, or $21.94/ac. Seed, fertilizer, and mulch, broad based dips, and water bars were the most expensive practices on a total cost basis. Culvert installation, streamside management zones, and road relocation costs were less expensive for most tracts.

Cumulative effects on an ecosystem.
Tippets, B.
Fort Collins, Colo. : The Service; 1990 Sep.
Language: English
Descriptors: Nevada; Ecosystems; National forests; Water quality; Research

Dissolved organic carbon cycling in forested watersheds: a carbon isotope approach.
Schiff, S.L.; Aravena, R.; Trumbore, S.E.; Dillon, P.J.
Language: English
Descriptors: Ontario; Watersheds; Forests; Carbon cycle; Carbon; Isotope labeling; Catchment hydrology; Water quality

Abstract: Dissolved organic carbon (DOC) is important in the acid-base chemistry of acid-sensitive freshwater systems; in the complexation, mobility, persistence, and toxicity of
metals and other pollutants; and in lake carbon metabolism. Carbon isotopes (13C and 14C) are used to study the origin, transport, and fate of DOC in a softwater catchment in central Ontario. Precipitation, soil percolates, groundwaters, stream, beaver pond, and lake waters, and lake sediment pore water were characterized chemically and isotopically. In addition to total DOC, isotopic measurements were made on the humic and fulvic DOC fractions. The lake is a net sink for DOC. delta 14C results indicate that the turnover time of most of the DOC in streams, lakes, and wetlands is fast, less than 40 years, and on the same time scale as changes in acidic deposition. DOC in groundwaters is composed of older carbon than surface waters, indicating extensive cycling of DOC in the upper soil zone or aquifer.


Descriptors: Oregon; Logging; Landslides; Floods; Sediment; Water erosion; Aerial photography; Canopy; Channels; Environmental impact; Riparian forests; Water quality; Water resources

Abstract: Downstream effects, a type of cumulative watershed effect, were identified using changes in the width and distribution of open riparian canopies measured from aerial photography taken between 1956 and 1979 in Elk River basin, southwest Oregon. Open canopies appear on serial photographs of densely forested basins as unvegetated areas bordering stream channels. Opening occurs when large disturbances, such as landslides, debris flows, large floods, and excessive sedimentation, disrupt the vegetation in the riparian corridor. Downstream changes in channel morphology, inferred by the changing pattern of open reaches were linked to upslope forestry activities; a causal link was assumed where: (i) open reaches extended continuously downstream from clearcuts and roads or (ii) the timing and pattern of opening downstream varied in direct relation to the intensity of upslope forestry activities. Open riparian canopies were observed in first-through fifth-order channels, though only 11% of open reaches in low-order channels were spatially connected to open reaches in higher order channels. Open reaches on low-order tributaries were attributed to landslides and surface erosion generated from clearcuts and roads; the total length of open reaches in low-order channels increased 30-fold during the study period. Open reaches occurred on higher-order channels throughout the study period but did not increase in size or change location in relation to upslope harvest activities. Instead, open canopies were restricted mainly to wide and low
gradient channel reaches, which comprised approximately one-third of the length of higher-order channels. Limited downstream change in riparian canopies associated with upslope forestry activity during the study period, which included a 100-yr storm, was attributed to three physical factors: (i) lack of debris flows in most parts of the basin; (ii) channels constrained by competent hillslopes limiting the potential for opening; and (iii) low harve
dissolved organic carbon (DOC) in streams draining one forested and two moorland catchments in southwest Scotland were measured over a 3-year period. Catchments were limed during the study and comparisons of stream chemistry were made before and after liming under the two land-use types. Within individual events, DOC and anion concentrations increased with increasing discharge, and aluminium concentrations showed little change with discharge. In the pre-liming phase as a whole, organic monomeric Al was strongly correlated with DOC and inorganic monomeric Al was strongly correlated with anions, particularly Cl. The forested catchment had higher mean DOC and SO4, but lower mean Al. After liming, Al concentrations were reduced, by up to 80% for monomeric forms, and these low levels prevented observation of correlations with DOC and anions. Liming treatments were effective in both forested and moorland catchments, lasted for at least 2.5 years after treatment, and low rates of application to bog areas were as effective as entire catchment treatments.

18 NAL Call. No.: QH545.A1E52
Effects of clearfelling on stream and soil water aluminium chemistry in three UK forests.
Language: English
Descriptors: Wales; Northern england; Clearcutting; Picea sitchensis; Coniferous forests; Aluminum; Soil chemistry; Water quality; Anions; Nitrate; Chloride; Sulfate; Acidification; Soil water; Forest soils

19 NAL Call. No.: 292.9 AM34
Effects of forest fertilization on stream water chemistry in the Appalachians. Edwards, P.J.; Kochenderfer, J.N.; Seegrist, D.W.
Bethesda, Md.: American Water Resources Association; 1991
Language: English
Descriptors: West Virginia; Streams; Water quality; Watersheds; Forest soils; Triple superphosphate; Ammonium nitrate; Nitrate nitrogen; Phosphorus; Seepage; Losses from soil systems

Language: English

Descriptors: Ontario; Boreal forests; Acid rain; Air temperature; Climatic change; Drought; Fire effects; Streams; Sulfates; Water pollution; Watersheds; Wildfires


Language: English

Descriptors: British Columbia; Pseudotsuga menziesii; Forest plantations; Glyphosate; Herbicides; Streams; Water pollution; Water composition and quality; Chemical analysis


Language: English

Descriptors: Western Australia; Deforestation; Land clearance; Watersheds; Catchment hydrology; Groundwater level; Streams; Stream flow; Salinity; Water quality; Agricultural land; Land use; Agricultural development

Abstract: A small (344ha) experimental catchment in southwest Western Australia was partially deforested (western 53% of the catchment) in 1976 to study the effects of agricultural development on water quantity and quality. The impact on the groundwater system in the cleared area was dramatic. Initial rates of rise were only 0.11 m year\(^{-1}\) but this increased after 10 years to average 2.3 m year\(^{-1}\). Groundwater rises of 15 m in the valley and 20-25 m on the lower sideslopes were observed over 13 years. A small seep (groundwater discharge area) appeared for the first time in 1988 and by 1989 it covered an area of 1 ha. Streamflow initially increased by 30 mm year\(^{-1}\) (4.0% rainfall) compared with a native forest average.
streamflow of 8 mm year\(^{-1}\) (1.0\% rainfall). However, since the seep area developed, the increase in streamflow has been 50 mm year\(^{-1}\) (6.6\% rainfall). Stream salinity was low prior to clearing (30 mg/l Cl\(^{-}\)) and remained low for 9 years after clearing. However, since 1987, stream salinity increased dramatically as the ground water approached the ground surface, and by 1989 reached an annual average of 290 mg/l Cl\(^{-}\). The daily maximum in 1989 was 2200 mg/l Cl\(^{-}\) compared with 92 mg/l Cl\(^{-}\) from 1976 to 1986. The catchment changed from net salt accumulation pre-clearing to net salt export after 1987. Thirteen years after clearing, the groundwater level, stream yield, stream salt load and stream salinity had not reached equilibrium but were all still increasing.

The effects of radiata pine plantation establishment and management on water yields and water quality—\(a\) review. Cornish, P.M.

Language: English
Descriptors: Pinus radiata; Forest plantations; Water quality; Water yield; Hydrology


Language: English
Descriptors: Wales; Coniferous forests; Clearcutting; Deforestation; Logging effects; Watersheds; Streams; Water quality; Acidification; Stream flow; Seasonal fluctuations; Groundwater; Soil chemistry; Losses from soil systems; Catchment hydrology

Abstract: The effects of a 3 year conifer harvesting programme on stream-water quality are described for the acidic and acid-sensitive Afon Hore catchment. Nitrate and potassium concentrations, initially almost quadrupled, have remained high for 4 years from the commencement of the harvesting programme. For the undisturbed (control) system, the fluctuations are small and peak during the winter months. With harvesting, a phase change takes place and peak concentrations occur during the autumn period. A similar pattern, but with no phase shift, is observed for dissolved organic matter, although concentrations increase less: peak concentrations
occur during the summer to autumn periods. During the first 2 years of felling, aluminium concentrations increase in the winter period: after that, concentration differences are much smaller. During the summer base-flow period, alkalinity and calcium values decrease. Sodium and chloride concentrations increase with time owing to a corresponding increase in the rainfall input. This trend is not observed for the stream in the felled catchment. For sulphate, there is a general decline in concentration for both the control and felled areas. With felling, a seasonal pattern has been introduced: the lowest concentrations occur in winter. The results are interpreted in terms of: (1) reduced atmospheric scavenging of sea salt and sulphur due to the loss of the trees; (2) increased losses of the nutrients from the soils due to reduced uptake by the vegetation; (3) increased aluminium releases from the soil's cation exchange store following increased total inorganic anion concentrations resulting from nitrate generation from (2); (4) a reduced contribution of ground water to the stream or an increased acidification of the ground water. The results are discussed in relation to environmental and water management issues. Nitrate production will probably not be of importance to either, owing to the low levels found in the stream. The increase in alum
different nitrogen nutrition level of the stands, microbial turnover in the soil, and former management practices (change of tree species, excessive nutrient export). Sulphur is not retained in either of the catchments. At Schluchsee, sulphur export exceeds input from canopy throughfall by a factor of 2.5. The higher output rates, both of nitrogen and sulphur at Schluchsee, are due to the much higher microbial mineralization of organic matter as shown by previous incubation tests. Differences in cation and proton export are mainly caused by a different drainage pattern. In contrast to the Schluchsee catchment, where vertical water pathways prevail, the streamwater solute output at Villingen is dominated by a shallow subsurface runoff. Atmospheric deposition is a contributing, but not the dominant, factor in the biogeochemical cycling at these sites. Hence, a generally applicable quantitative definition of 'critical loads', especially for nitrogen, is illusory and the use of such numbers will be misleading.

Factors controlling throughfall chemistry in a balsam fir canopy: a modeling approach.
Lovett, G.M.; Reiners, W.A.; Olson, R.K.

Language: English

Descriptors: Forest influences; Abies; Canopy; Leaves; Leaching; Rain; Simulation models; Water composition and quality; Water uptake

Fate, dissipation and environmental effects of pesticides in southern forests: a review of a decade of research progress.
Neary, D.G.; Bush, P.B.; Michael, J.L.

Language: English

Descriptors: Southern states of U.S.A.; Pesticides; Forestry; Ecosystems; Watersheds; Environmental impact; Water quality; Air quality; Groundwater pollution; Silviculture; Species diversity; Simulation models; Nontarget effects; Literature reviews

Federal and Virginia agricultural and forestry programs for
Brown, Cheryl L.
Virginia Polytechnic Institute and State University, Dept. of Agricultural Economics
Blacksburg, Va. : Dept. of Agricultural Economics, Virginia Polytechnic Institute and State University.; 1990.
25 leaves ; 30 cm. (SP (Virginia Polytechnic Institute and State University. Dept. of Agricultural Economics) ; 89-22.).
Draft for review. Includes bibliographical references (leaves 22-25).

Language: English

29
NAL Call. No.: 500 AS73
Forest blowdown and lake acidification.
Dobson, J.E.; Rush, R.M.; Peplies, R.W.

Language: English
Descriptors: New York; Forest damage; Windfalls; Water quality; Lakes; Mountain areas; Acid deposition; Ph; Water pollution; Literature reviews

30
NAL Call. No.: 292.8 J82
Forest hydrologic research in China.
Yu, X.

Language: English
Descriptors: China; Forests; Hydrology; Research; Forest resources; Water resources; Forest influences; Water supply; Evapotranspiration; Precipitation; Runoff; Erosion; Water quality; Technology; Literature reviews

Abstract: This paper gives the background and the main results of forest hydrologic research in China.

31
NAL Call. No.: 99.8 F768
Forest water quality protection: a comparison of regulatory and voluntary programs.

Language: English
Descriptive: Maryland; Virginia; Forests; Water quality; Legislation; Resource conservation

32 NAL Call. No.: 100 AR42F
Forest watershed.
Lawson, E.R.; Beasley, R.S.; Miller, E.L.; Turton, D.J.
Fayetteville, Ark. : The Station; 1989 Nov.
Arkansas farm research - Arkansas Agricultural Experiment Station v. 38 (6): p. 6. maps; 1989 Nov.
Language: English
Descriptors: Arkansas; Forests; Watersheds; Water composition and quality; Water yield; Research projects

33 NAL Call. No.: aSD433.A53
Forested wetlands in urbanizing landscapes.
Brown, M.T.
Language: English
Descriptors: Florida; Wetlands; Forests; Urbanization; Legislation; Environmental protection; Communities; Vegetation types; Water composition and quality; Hydrology; Land use

34 NAL Call. No.: S544.3.M9E23
Forestry BMP's: forest stewardship guidelines for water quality. Logan, B.; Clinch, B.
Language: English
Descriptors: Forest management; Forestry engineering; Streams; Roads; Harvesting

35 NAL Call. No.: 1.90 C2OU8
Forestry implications of water quality and wetland law.
Siegel, W.C.
Forests and surface water acidification.
Nisbet, T. R.
Great Britain, Forestry Commission
v, 7, [1] p. : ill. ; 25 cm. (Forestry Commission bulletin ; 86). Summary also in French and German. Includes bibliographical references (p. 7-[8]).

Functions and values of bottomland hardwood forests along the Cache River, Arkansas: implications for management.
Clairain, E.J. Jr; Kleiss, B.A.

Functions and values of forested wetlands in the southern United States. Walbridge, M.R.

Functions and values of bottomland hardwood forests along the Cache River, Arkansas: implications for management.
Clairain, E.J. Jr; Kleiss, B.A.

Functions and values of forested wetlands in the southern United States. Walbridge, M.R.
Groundwater response to reforestation in the Darling Range of western Australia.
Bell, R.W.; Schofield, N.; Loh, I.C.; Bari, M.A.
Includes references.

Language: English

Descriptors: Western australia; Water table; Salinity; Watersheds; Pastures; Land; Clearance; Afforestation; Land use; Agricultural development; Catchment hydrology; Water quality

Abstract: Replacement of deep-rooted perennial vegetation with annual crops and pastures has led to rising groundwater tables and transport of previously stored salts to streams in south-west Western Australia. Trials to determine the potential of various reforestation strategies to reverse this process by lowering the groundwater table were commenced in 1976. Results are reported from six experimental sites for the period 1979-1986. Despite the mean annual rainfall of the experimental period being 10% below the 1926-1986 mean, groundwater levels under pasture rose by up to 1.2 m. The change in groundwater levels beneath reforestation ranged from a 0.6 m increase to a 3 m decrease relative to the ground surface. Groundwater levels under reforestation in all cases decreased relative to groundwater levels under pasture. The magnitude of this reduction was shown to increase with the proportion of cleared area reforested and with the crown cover of the reforestation. The salinity of the water table decreased by 12% under reforestation and by 32% under pasture over the period 1979-1986.
Historical relationships between research and resource management in the Apalacahicola River estuary. 
Livingston, R.J. 
Tempe, Ariz. : Ecological Society of America; 1991 Nov. 
Includes references.

Language: English

Descriptors: Florida; Water pollution; Pesticide residues; Forestry practices; Organic matter; Nutrient availability; Estuaries; Aquatic organisms; Aquatic communities; Research projects

Hydrochemical variations in spruce, beech, and grassland areas, Mont Lozere, southern France. 
Durand, P.; Neal, C.; Lelong, F.; Didon-Lescot, J.F. 
Includes references.

Language: English

Descriptors: France; Grasslands; Fagus; Picea; Watersheds; Acidification; Streams; Precipitation; Chemical composition; Water quality; Stream flow; Catchment hydrology

Abstract: Eight years of hydrochemical data are presented for streams draining beech forest, grassland and spruce forest catchments in the Mont Lozere region. The mean concentration of cations in the streams occurs in the order: beech forest < grassland < spruce forest. The broad changes in stream chemistry follow a synchronous pattern related to variations in climatic conditions. Stream chemistry varies only to a moderate degree with flow, though in fine detail concentration fluctuations are very complex during storm events; hysteresis is observed. Estimations of pCO2 levels from the pH and alkalinity data show a wide scatter: the levels seem to be about five times the atmospheric value for all the streams. It is concluded that these catchments are still in an early stage of acidification. The spruce forest catchment acidifies faster...
than the woodland and the grassland catchments. Uncertainty remains as to the importance of air scavenging processes.


Language: English

Descriptors: Wales; Stream flow; Drainage water; Watersheds; Picea sitchensis; Water quality; Acidification; Catchment hydrology; Temporal variation; Seasonality

Abstract: Results are presented for a study attempting to assess the effects of conifer planting/harvesting and acidic oxide deposition on streamwater quality in a 25 to 45-year-old sitka spruce plantation on acid moorland. This is undertaken to demonstrate the application of a multi-element survey in providing 'chemical fingerprints' for describing hydrological and hydrochemical controls within catchments. Hafren forest streamwater chemistry varies for different components: nitrate, bromide, total iodine and total organic carbon show seasonal oscillations varying in phase and amplitude; aluminium and hydrogen ion concentrations vary as a function of flow; manganese and cobalt remain approximately constant except under very dry conditions when concentrations reduce by up to 10 fold. No direct link exists between rain and streamwater chemistry: streamwater chemistry variations are determined primarily by hydrological and chemical reactions in the surface organic-rich soils and the underlying inorganic soils/bedrock. Reactions in the organic-rich horizons involve the generation of acidic conditions and the mobilization/transport of transition metals that can be easily hydrolysed. Biologically mediated breakdown processes determine, in part, the hydrochemical behaviour of dissolved organic carbon, the nutrients, bromine and iodine. Reactions in the inorganic zones involve hydrogen ion consumption and the release of calcium and magnesium. Bicarbonate ions are generated by deprotonation of biogenically derived H2CO3 and the decomposition of calcium carbonate in the bedrock. The initial effects of forest clearfelling are demonstrated; increases in nitrate and potassium occur. A simple mixing model is presented to show that either a large proportion of the storm water is derived from 'non-hillslope', 'groundwater', sources, or major modifications occur as soil water passes rapidly to the stream; whichever process is operative, it has not been identified directly within the catchment.
Hydrologic and water quality effects of fire.
Baker, M.B. Jr
Fort Collins, Colo. : The Station; 1990 May.

Language: English

Descriptors: Prescribed burning; Wildfires; Catchment hydrology; Water quality; Forests; Rangelands; Stream flow; Sediment; Soil water; Erosion; Nutrients; Mineralization

Hydrological controls on acid runoff generation in an afforested headwater catchment at Llyn Brianne, Mid-Wales.
Soulsby, C.
Includes references.

Language: English

Descriptors: Wales; Watersheds; Afforestation; Coniferous forests; Acidity; Runoff; Aluminum; Soil water; Stagnopodzols; Peat soils; Acid soils; Hydrological factors; Catchment hydrology; Overland flow; Storms; Drainage channels; Surface water; Seepage

Abstract: Recent research has shown that storm runoff in afforested catchments at Llyn Brianne, Mid-Wales, is acidic and Al rich. However, relatively little is known about which hydrological pathways contribute to the generation of acid storm runoff. This paper reports the results of a year-long field investigation which examined the hydrological controls on stream water chemistry in a 1.5 ha subcatchment dominated by stagnopodzol and peat soils. During storm episodes, overland flow from the peat makes the dominant runoff contribution to the hydrological response of the subcatchment. This is strongly acidic (pH < 4.0) with a low Al content, though its interaction with the mineral lining of drainage channels results in the release of Al into surface waters. The stagnopodzols are characterized by vertical hydrological pathways; lateral flow occurs only above the bedrock, 1 m below the soil surface. In storm events, this flow path transfers acidic (pH 4.5), Al-rich soil water to streams. Drainage from the stagnopodzols also sustains base flows from the subcatchment. Almost 30% of effective precipitation is lost from the subcatchment as seepage, mainly through the drift material lining forest drainage channels. Seepage losses to deeper flow paths appear to be important in headwater catchments in upland Wales and warrant further study.
Impacts of afforestation on water quality trends in two catchments in mid-Wales.
Waters, D.; Jenkins, A.

Language: English

Descriptors: Wales; Afforestation; Picea sitchensis; Larix leptolepis; Water quality; Watersheds; Acidification; Coniferous forests; Streams; Surface water; pH; Acidity; Forest influences; Age of trees; Sulfate; Air pollution; Computer simulation

Implementation of the Clean Water Act (PL92-500) through best management practices implementation and monitoring.
Parker, T.

Language: English

Descriptors: Oregon; Washington; Water quality; Water management; Water pollution; Law; Federal government; National forests

The interaction of forest vegetation and soils with the aquatic environment: effects of catchment liming on lakes.
Dalziel, T.R.K.; Howells, G.; Skeffington, R.A.

Language: English

Descriptors: West scotland; Forests; Forest soils; Liming; Acid deposition; Acidification; Air pollution; Catchment hydrology; Water quality
Leaching of atrazine and hexazinone from Abies nordmanniana (Steven) Spach plantations. 
Felding, G. 
Language: English  
Descriptors: Denmark; Atrazine; Hexazinone; Drainage water; Sandy loam soils; Leaching; Metabolites; Groundwater pollution; Forest plantations; Abies nordmanniana  
Abstract: The content of the herbicides atrazine and hexazinone was measured in drainage water from seven to ten-year-old plantations grown with Abies nordmanniana (Steven) Spach on two clayey soils in Denmark. The concentrations of atrazine varied between 0.06 and 7.79 microgram litre-1. The concentrations of hexazinone were different at the two locations. ranging from 0.07 to 2.09 microgram litre-1 at Bremersvold and from 3.47 to 42.66 microgram litre-1 at Koege. Metabolites of both herbicides were identified. 

Longitudinal patterns of concentration-discharge relationships in stream water draining the Hubbard Brook Experimental Forest, New Hampshire. Lawrence, G.B.; Driscoll, C.T. 
Special issue: Transfer of elements through the hydrological cycle / C. Neal and M. Hornung, guest editors. Includes references.  
Language: English  
Descriptors: New Hampshire; Stream flow; Drainage water; Subsurface layers; Forests; Watersheds; Catchment hydrology; Biogeochemistry; Spatial variation; Temporal variation; Acidification; Neutralization  
Abstract: Longitudinal variations of concentration-discharge relationships and chemical fluxes were evaluated in two headwater streams at the Hubbard Brook Experimental Forest, New Hampshire. At high elevations changes in subsurface flow paths explained variations in H+, inorganic Al and Si concentrations, whereas variations of DOC concentration were inconsistent with this mechanism. Flow responses of middle and low elevation subcatchments were influenced by variable contributions of hydrologic source areas and the elevational concentration gradient which exists in these catchments, but in most cases were not consistent with responses predicted by changes in flow paths. Spatial patterns of chemical fluxes indicate that, in general, catchment neutralization processes increased in effectiveness in the downslope direction. However, this pattern can be interrupted by secondary tributaries, both ephemeral and persistent, which originate in
variable source areas that contribute acidic surface runoff during high flow conditions. Current models of catchment acidification need to incorporate spatial variations of biogeochemical processes and flow responses to improve predictions of short-term variations in surface water chemistry.

52 NAL Call. No.: aSD11.U56
Long-term implications of forest harvesting on nutrient cycling in central hardwood forests.
Lynch, J.A.; Corbett, E.S.
Language: English
Descriptors: Pennsylvania; Harvesting; Hardwoods; Cycling; Water quality; Clearcutting

53 NAL Call. No.: QH540.J6
Long-term ionic increases from a central Appalachian forested watershed. Edwards, P.J.; Helvey, J.D.
Language: English
Descriptors: West Virginia; Watersheds; Mountain forests; River water; Calcium ions; Electrical conductivity; Ion activity; Nitrate; Nitrification; Precipitation; Streams; Water quality; Forest soils; Leaching

Abstract: The electrical conductivity of stream water draining from an unmanaged and undisturbed control watershed has been increasing rather steadily, about 0.03 mS m\(^{-1}\) yr\(^{-1}\), since 1971. During this period, NO\(_3^-\) and Ca\(^{2+}\) concentrations increased and were shown to mathematically account for the ionic contribution to conductivity; therefore, they are believed to be primarily responsible for the increase. However, the percentage of conductivity explained by the two ions was different over time. The percentage of conductivity attributable to NO\(_3^-\) increased in a pattern very similar to concentration. In contrast, the percentage of conductivity attributable to Ca\(^{2+}\) decreased slightly over time. The Ca\(^{2+}\) is believed to be pairing with the NO\(_3^-\) as the NO\(_3^-\) ions leach through the soil. While nitrification in mature stands can be strongly inhibited, limited nitrification, especially in forest gaps, and high anthropogenic inputs of NO\(_3^-\) probably were primary sources of the leached NO\(_3^-\). Preferential adsorption of SO\(_4^{2-}\), rather than NO\(_3^-\), on soil colloids is
given as an explanation for the lack of retention of NO3- in the soil system and subsequent leaching to the stream.

54 NAL Call. No.: aSD433.A53
Language: English
Descriptors: South eastern states of U.S.A.; Water pollution; Wetlands; Silviculture; Forestry practices; Upland areas; Biogeochemical cycles; Water composition and quality; Catchment hydrology; Stream flow; Watersheds; Nutrients

55 NAL Call. No.: HC79.E5E5
Language: English
Descriptors: Czechoslovakia; Watersheds; Landscape ecology; Optimization; Surface water; Water pollution; Farming; Forestry; Expert systems; Site types

56 NAL Call. No.: 56.8 J822
Language: English
Descriptors: Georgia; Water pollution; Animal wastes; Bioremediation; Water quality; Runoff; Riparian forests; Wetlands; Reclamation; Pollution control

57 NAL Call. No.: QH540.J6
Abstract: There is increasing concern over the possibility of adverse cumulative watershed effects from intensive forest management. It is impractical to address many aspects of the problem experimentally because to do so would require studying large watersheds for 100 yr or more. One such aspect is the long-term effect of forest management strategies on erosion and sedimentation and the resultant damage to fish habitat. Is dispersing activities in time and space an effective way to minimize cumulative sedimentation effects? To address this problem, Monte Carlo simulations were conducted on four hypothetical 10 000-ha fifth-order forested watersheds: one watershed was left undisturbed, one was completely clearcut and roaded in 10 yr, with cutting starting at the head of the watershed and progressing toward the mouth, another was cut at the rate of 1% each year beginning at the watershed's mouth and progressing upstream, and another was cut at a rate of 1% each year, with individual cut areas being widely dispersed throughout the watershed. These cutting patterns were repeated in succeeding centuries, rebuilding one-third of the road network every 100 yr. The parameters governing the simulations were based on recent data from coastal Oregon and northwestern California. Mass wasting, the most important source of sediment in that environment, was the only hillslope process modeled. The simulation results suggest that (i) the greatest differences between management strategies appeared in the first 100 yr and were related primarily to the rate of treatment. By the second 100 yr, when all watersheds had been treated, the principal difference between logging strategies was the timing of impacts. (ii) Dispersing harvest units did not significantly reduce cumulative effects. (iii) The frequency of bed elevation changes between 1 and 4 cm is dramatically increased by logging.
Abstract: A model of the combined long-term effects of acidic deposition and forest growth has been developed and calibrated for an upland site in Scotland. The model is used to perform a series of simulation experiments to assess the relative effects of afforestation and acidic deposition on soil and surface water chemistry. The experiments compare and contrast: (a) the simulated historical effects of increased acidic deposition and forest growth, both individually and in combination; (b) the simulated future effects of various levels of reduction of deposition in combination with the forestry strategies of harvesting with and without replanting. Results indicate that historical acidification of surface waters in areas receiving high levels of acidic deposition has been exacerbated by afforestation practices. Afforestation in the absence of acidic deposition, however, has had a lesser effect on surface water acidification even though the nutrient demands of forest growth have caused significant soil acidification. Comparisons of future forest management strategies in conjunction with likely deposition reductions indicate that, in sensitive areas, replanting of a felled forest without treatment of the soil by addition of base cations, should not be undertaken even if significant deposition reductions are realised.
Abstract: This study was conducted to assess the removal of groundwater nitrate (NO$_3^-$) in different soil drainage classes within three riparian forests located in Rhode Island. A solution of NO$_3^-$ and a conservative tracer [either bromide (Br$^-$) or chloride (Cl$^-$)] was applied in the growing and the dormant seasons to trenches upgradient of wetland locations with hydric soils (poorly and very poorly drained soils) and transition zone locations with somewhat poorly and moderately well-drained soils located immediately upslope of the wetlands. To assess removal, the change in groundwater concentrations of NO$_3^-$ relative to the concentration of the conservative tracer was observed in monitoring wells located in each soil drainage class from June 1989 through April 1990. Removal of groundwater NO$_3^-$ was consistently high in the wetland locations, generally in excess of 80% in both growing and dormant seasons. In the transition zones, attenuation was less than 36% during the growing season, and ranged from 50 to 78% in the dormant season. Attenuation in the transition zones was positively correlated with water table elevations. Transition zone attenuation was high in the dormant season relative to the growing season likely because high water tables during the dormant season caused the contaminant plume to be exposed to soil with higher organic matter. The results suggest that both wetlands and transition zones between wetlands and uplands can be important sinks for groundwater NO$_3^-$.

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Nitrate reduction in an unconfined sandy aquifer: water chemistry, reduction processes, and geochemical modeling.
Postma, D.; Boesen, C.; Kristiansen, H.; Larsen, F.
Includes references.

Language: English

Abstract: Nitrate distribution and reduction processes were investigated in an unconfined sandy aquifer of Quaternary age. Groundwater chemistry was studied in a series of eight multilevel samplers along a flow line, deriving water from both arable and forested land. Results show that plumes of nitrate-contaminated groundwater emanate from the agricultural
areas and spread through the aquifer. The aquifer can be subdivided into an upper 10- to 15-m thick oxic zone that contains O2 and NO3(-), and a lower anoxic zone characterized by Fe2+-rich waters. The redox boundary is very sharp, which suggests that reduction processes of O2 and NO3(-) occur at rates that are fast compared to the rate of downward water transport. Nitrate-contaminated groundwater contains total contents of dissolved ions that are two to four times higher than in groundwater derived from the forested area. The persistence of the high content of total dissolved ions in the NO3(-) free anoxic zone indicates the downward migration of contaminants and that active nitrate reduction is taking place. Nitrate is apparently reduced to N2 because both nitrite and ammonia are absent or found at very low concentrations. Possible electron donors in the reduced zone of the aquifer are organic matter, present as reworked brown coal fragments from the underlying Miocene, and small amounts of pyrite at an average concentration of 3.6 mmol/kg. Electron balances across the redoxcline, based on concentrations of O2, NO3(-), SO4(2-) and total inorganic carbon (TIC), indicate that pyrite is by far the dominant electron donor even though organic matter is much more abundant. Groundwater transport and chemical reactions were modeled using the code PHREEQM, which combines a chemical equilibrium model with a one-dimensional mixing cell transport model. Only the vertical component of the water transport was modeled since, in contrast to rates along flow lines, the vertical rates are close to constant as required by the one-dimensio
Abstract: Nitrous oxide is soluble and can accumulate in soil solution when gaseous diffusion is restricted. The importance of N losses via degassing of N2O from groundwater entering surface streams is unknown. Measurements of N2O in soil solution revealed patterns of seasonal and spatial variation that were consistent with ecosystem regulation of denitrification. The highest concentrations were observed in the riparian zone in May, when soil NO3-, temperature and moisture were conducive for denitrification. At each of the other sample dates and sites, at least one of these factors appeared to prevent significant N2O accumulation in soil solution. Extrapolation of the highest observed N2O concentrations to an annual basis corresponded to a loss of only 56 g N ha-1 yr-1. Denitrification in the riparian zone may be an important fate of N in this hardwood forest, but N2O in soil solution does not appear to be a significant pathway of N loss. This site might be expected to produce N2O at higher rates than most hardwood forests, but extrapolation of the highest calculated losses from soil solution over the global area occupied by hardwood forest indicates that this source of N2O is insignificant for global atmospheric budgets.
Reviews

66  

Language: English

Descriptors: Colorado; Watersheds; Alpine vegetation; Subalpine forests; Streams; Water quality; Water content; Discharge; Calcium; Magnesium; Potassium; Sodium; Ammonium; Hydrogen; Nitrate; Sulfate; Chloride; Variation; Meltwater; Soil water; Precipitation; Catchment hydrology

Abstract: Streamwater samples were collected during 1987-1988 from two adjacent gauged watersheds, the subalpine-alpine East St. Louis and the Fool Creek Alpine, in the Fraser Experimental Forest, Colorado. The study objective was to compare the relationships between streamwater discharge and ion concentration in alpine and alpine-subalpine watersheds at a site receiving low inputs of atmospheric contaminants. Streamwater discharge accounts for much of the variation in ion concentration. Trajectories of time, discharge, and ion concentration suggest that patterns of nutrient flux are controlled primarily by the magnitude of streamwater discharge, and seasonal differences in the relative contributions of snowmelt and soil water. In the subalpine catchment, increased streamwater discharge accounted for most of the decline in concentration of ions, with high concentrations in soil water relative to precipitation. This relationship was not seen in the alpine catchment, probably because of the influence of large diurnal variation in the ratio of snowmelt to soil water. In both catchments, ions with comparatively high concentrations in precipitation and the snowpack relative to soil water showed less concentration decline with increased streamwater discharge. The recurring nature of the trajectories, especially in the subalpine catchment, suggests that the time, discharge, and ion concentration patterns may represent a general characteristic in moderate-sized, undisturbed Rocky Mountain catchments which do not receive high inputs of airborne contaminants.

67  
Abstract: Biogeochemical cycling of S and N was quantified at two hardwood sites (Turkey Lakes watershed (TLW) and Huntington Forest (HF)) that have sugar maple (Acer saccharum Marsh.) as the major overstory component and are underlain by Spodosols (Podzols). TLW and HF are located in central Ontario (Canada) and the Adirondack Mountains of New York (U.S.A), respectively. Major differences between the TLW and HF sites included stand age (300 and 100 years for TLW and HF, respectively), age of dominant trees (150-300 and 100 years for TLW and HF, respectively), and the presence of American beech (Fagus grandifolia Ehrh.) at HF as well as lower inputs of SO4(-2) and NO3(-) (differences of 99 and 31 mol ion charge (molc).ha-1.year-1, respectively) at TLW. There was an increase in concentration of SO4(-2) and NO3(-) after passage through the canopy at both sites. A major difference in the anion chemistry of the soil solution between the sites was the much greater leaching of NO3(-) at TLW compared with HF (1300 versus 18 molc.ha-1.year-1, respectively). At HF, but not TLW, there was a marked increase in SO4(-2) flux (217 molc.ha-1.year-1) when water leached from the forest floor through the mineral soil. The mineral soil was the largest pool (> 80%) of N and S for both sites. The mineral soil of TLW had a C:N ratio of 16:1, which is much narrower than the 34:1 ratio at HF. This former ratio should favor accumulation of NH4(+) and NO3(-) and subsequent NO3(-) leaching. Laboratory measurements suggest that the forest floor of TLW may have higher N mineralization rates than HF. Fluxes of N and S within the vegetation were generally similar at both sites, except that net requirement of N at TLW was substantially lower (difference of 9.4 kg N.ha-1.year-1). The higher NO3(-) leaching from TLW compared with HF may be attributed mostly to stand maturity coupled with tree mortality, but the absence of slow decomposing beech leaf litter and lower C:N ratio in die soil of the former site.
On-site assessment of best management practices as an indicator of cumulative watershed effects in the Flathead Basin.

Ehinger, William; Potts, Donald F.
Flathead Basin Forest Practices, Water Quality and Fisheries Cooperative Program

Language: English

Descriptors: Flathead National Forest (Mont.); Forest management; Water quality management; Sediment transport

"Oregon Department of Forestry's use of geotechnical specialists." Michael, D.L.
Bethesda, Md. : The Society; 1990.

Language: English

Descriptors: Oregon; Harvesting; Water quality; Landslides; Monitoring

Partitioning and fate of acephate and its metabolite, methamidophos, from white spruce cones into soil and water.
Sundaram, K.M.S.

Language: English

Descriptors: Acephate; Methamidophos; Persistence; Application rates; Picea glauca; Seed cones; Forest soils; Sandy loam soils; Clay loam soils; River water; Ponds; Insecticide residues; Soil water; Soil organic matter; Physicochemical properties; Turbidity; Temperature; Water content; Microorganisms; Microbial degradation; Nontarget effects; Water pollution; Soil pollution
Persistent conflicts over timber production and watershed management: a problem analysis.
Abubakar, M.M.; Lord, W.B.
Bethesda, Md. : American Water Resources Association; 1992

Language: English

Descriptors: Oregon; Watersheds; Watershed management; Logging; Logging effects; Water quality; Decision making; Case studies

Abstract: Most forest lands are managed for multiple purposes, among them timber production and water supply. Conflicts often arise in such cases because logging is perceived as a threat to water quality. These conflicts can result from uncertain factual information, from differences in underlying social values, or from imbalances in the incidence of costs and benefits. Resulting conflicts may go unresolved because existing institutional structures fail to address the real roots of the dispute. When such conflicts go unresolved, benefits are often lost, and social, political, and managerial costs are high. This study found that the roots of conflict may lie in value differences or in interest impacts, but attention may be focused inappropriately and unproductively on factual issues. It suggests that at least some long-standing disputes in the management of forested watersheds may be resolved by identifying the root causes of these disputes and choosing those actions, whether they be changes in management guidelines or altered institutional structures, which are appropriate to those causes.

Picloram movement in soil solution and streamflow from a coastal plain forest. Michael, J.L.; Neary, D.G.; Wells, M.J.M.

Language: English

Descriptors: Pueraria lobata; Weed control; Picloram; Pinus palustris; Leaching; Pesticide persistence; Mineral soils; Soil solution; Stream flow; Environmental pollution; Aerial application

Abstract: Picloram (4-amino-3,5,6-trichloropicolinic acid) was aerially applied to a longleaf pine (Pinus palustris L.) site in the upper coastal plain of Alabama to control kudzu [Pueraria lobata (Willd.) Ohwi]. Pellets (10% a.i.) were spread at the rate of 56 kg ha⁻¹ on loamy sand Typic Kanhapludult soils. Movement of this herbicide was monitored with mineral soil samples, tension-cup lysimeters,
flowproportional streamflow samplers, and discrete samplers. Picloram levels in the upper 15 cm of mineral soil peaked at 0.96 to 2.25 mg kg\(^{-1}\) 25 d after application, depending on slope position, and declined to 0.13 to 0.29 mg kg\(^{-1}\) 1 yr later. In soil solution, picloram was detected at a depth of 0.4 m between 26 and 273 d after application. Only 4 of 15 lysimeters consistently contained detectable residues. Maximum picloram levels in soil solution were 130, 450, and 191 mg m\(^{-3}\) for ridge, midslope, and toe-slope positions, respectively. Downstream monitoring began 4 d after the herbicide application, and an initial concentration of 68 mg m\(^{-3}\) of picloram was detected. The maximum downstream concentration of 77 mg m\(^{-3}\) occurred 18 d after the application, immediately after the second storm event. Downstream levels dropped to less than 10 mg m\(^{-3}\) after 90 d and to less than 2 mg m\(^{-3}\) after 200 d. Following localized retreatment along the stream more than a year after the initial treatment, levels climbed again into the 20 to 30 mg m\(^{-3}\) range. Most of the initial off-site movement came from a perennial stream that had been inadvertently treated, but subsequently storm runoff was the largest contributor to stream contamination. Picloram residues in this stream were similar to those observed downstream, but they were higher (up to 241 mg m\(^{-3}\) and dropped faster to below 2 mg m\(^{-3}\) after D 150.

74 NAL Call. No.: 500 K41
Posttreatment effects of forest fertilization on the predominant benthic community of a headwater stream in eastern Kentucky.
Phillippi, M.A.; Coltharp, G.B.
Louisville, Ky.: The Academy; 1990 Mar.
Language: English
Descriptors: Kentucky; Nitrogen fertilizers; Aquatic communities; Benthos; Insects; Invertebrates; Streams; Water composition and quality; Water pollution; Watersheds; Woodlands

75 NAL Call. No.: 292.8 J82
Preliminary analysis of water and solute movement beneath a coniferous hillslope in Mid-Wales, U.K.
Chappell, N.A.; Ternan, J.L.; Williams, A.G.; Reynolds, B.
Language: English
Descriptors: Wales; Soil water; Streams; Hill land; Coniferous forests; SoluteS; Sulfates; Nitrate; Aluminum; Hydrogen ions;
Abstract: Streams draining coniferous forests are often loaded with solutes such as hydrogen ion, sulphate, nitrate and aluminium. As a result, fish populations can be reduced and water quality may fall below recommended potable standards. The transport of ions into water-courses is governed by the movement of water. Within most temperate and tropical areas the stream discharge and chemistry, during periods of rapid runoff, is dominated by the exfiltration of water and solutes from stream-side soils. The movement of water to stream-side or 'riparian' areas remains, however, an enigma. This paper attempts to explain how the riparian area might be rapidly recharged during storm events. Two analytical techniques, the free-surface method and tangent-continuity method, are applied to hydrological properties monitored on a steep coniferous hillslope, during a selected storm event. Comparison of the ionic concentrations of waters within each component of the hydrological system, is used to verify the hydrological analysis. Perched water-tables developed within the basal zones of the O/Ah and Eag soil horizons of the steep podzolic hillslope, during all major storm events. Most of the rapid response within the riparian zone could be explained by lateral flow in these near-surface soil horizons, particularly in the saturated basal zones. This pathway is corroborated by the similarity of riparian zone and near-surface (or topsoil) chemistries. Relatively low concentrations of monomeric aluminium and relatively high concentrations of chloride, sodium and hydrogen ion were observed within these zones, compared with the subsoil (Bsl and B/C) horizons.
78 Regulation of private forest land--an assessment of public and/or private costs of water quality protection.
Haney, H.L. Jr; Shaffer, R.M.

79 Regulatory versus voluntary forest water quality programs in Maryland and Virginia.
Hawks, L.J.; Cubbage, F.W.; Newman, D.H.

80 The response of vegetation to chemical and hydrological gradients in the Lost River peatland, northern Minnesota.
Glaser, P.H.; Janssens, J.A.; Siegel, D.I.

Abstract: (1) Two peat mounds have developed in the Lost River peatland of northern Minnesota. One has the chemical and physical properties of an extremely rich fen and the other has the properties of a raised bog. The two mounds are separated
by a water track with poor-fen vegetation and chemistry. (2) The vegetation at Lost River can be divided into five nodes that correspond to landform units: spring-fen channel, spring-fen forest, marginal swamp forest, water track, and raised bog. These vegetation types have well-defined ranges for pH and calcium concentration. (3) Ordinations of the vascular plant and bryophyte data indicate a close relationship between the vegetation and both moisture and chemical gradients. The link between vegetation and chemistry is also supported by plots of species richness vs. pH and calcium concentration in which the peak in species numbers occurs within the rich-fen range. (4) The chemistry of the surface waters at Lost River is largely determined by the mixing of alkaline groundwater with precipitation, because the entire peatland is located at least seasonally within a discharge zone for groundwater. Mixing models indicate that the amount of groundwater within the surface waters ranges from 50% in the spring-fen channels to 1% on the raised bog. (5) The development of the two peat mounds was reconstructed from peat cores collected near the crests of the spring-fen mound and raised bog. The raised bog developed over a depression, which was first filled in with fen peat before minerotrophic sphagna invaded the site around 2625 B.P. By 2200 B.P. all fen indicator species had disappeared and the site was dominated by assemblages similar to those in the present raised bog. (6) The spring-fen mound, however, developed over a rise in the mineral substrate, which was not covered by peat until 3000 B.P. The mound was quickly colonized by Sphagnum and no fen indicators appeared until 1160 B.P. At this time the bog vegetation was replaced by a sedge fen.

81 NAL Call. No.: TD420.A1P7
Reuse of wastewater from meat processing plants for agricultural and forestry irrigation.
Russell, J.M.; Cooper, R.N.; Lindsey, S.B.

Language: English

Descriptors: New Zealand; Meat and livestock industry; Industrial wastes; Chemical composition; Water reuse; Irrigation water; Irrigated pastures; Forestry; Groundwater pollution; Nitrates

82 NAL Call. No.: QH540.J6
Riparian afforestation effects on water yields and water quality in pasture catchments.
Smith, C.M.
Abstract: The flow records for two pasture headwater catchments for 9 yr before, and 9 yr after riparian afforestation in one catchment were compared. Average rainfall was 1021 mm per yr. Riparian afforestation reduced water yields by 68 to 104 mm (21-55%) when the Pinus radiata stand was 8 to 10 yr old. Delayed runoff declined by 52 to 93 mm per yr (27-63%). Afforestation reduced the quickflow yield in 1 yr (22 mm or 40%). Peak flows declined in small events, were not affected in medium-sized events, and may have increased in large events. The large reductions in yield indicate that the riparian zone had a disproportionately important influence on catchment hydrology. They are attributed to high transpiration losses from the riparian pine in seasons with water deficits, and higher than usual forest interception losses because of the small-scale planting. Streamwater sediment, total and dissolved N and P concentrations in these two catchments and another riparian afforested catchment were monitored for 2 yr. Concentrations were generally lower in the completely pastured catchment. Estimated annual sediment, total P, Kjeldahl N, and nitrate exports from the pasture catchment were 31 to 60%, 70%, 61 to 64% and 58 to 74% of those from the riparian afforested catchments in spite of a higher water yield. Possible explanations for the poor water quality in riparian afforested catchments are described including the lack of riparian wetlands, in-stream vegetation, and close riparian ground cover. The consequences of riparian afforestation in pasture catchments may not readily be predicted from the impacts of complete catchment afforestation.

83                                 NAL Call. No.: S544.3.0505
Riparian forest buffers.
Anderson, S.; Masters, R.

Language: English

Descriptors: Oklahoma; Riparian forests; Riparian vegetation; Floodplains; Water quality; Wildlife; Habitats; Endangered species; Conservation
Riparian forest buffers function and design for protection and enhancement of water resources.

Welsch, David J.
United States, State and Private Forestry, Northeastern Area
20, 4 p. : ill. (some col.) ; 28 cm. NA-PR-07-91. Includes bibliographical references (p. 20).

Language:  English
Descriptors: Streambank planting; Water quality management

Riparian nitrogen dynamics in two geomorphologically distinct tropical rain forest watersheds: subsurface solute patterns.

McDowell, W.H.; Bowden, W.B.; Asbury, C.E.

Language:  English
Descriptors: Puerto Rico; Groundwater; Hydrology; Ammonium; Nitrates; Nitrogen cycle; Leaching; Soil texture; Water quality; Watersheds; Tropical rain forests

The role of ammonium and nitrate retention in the acidification of lakes and forested catchments.

Dillon, P.J.; Molot, L.A.

Language:  English
Descriptors: Ontario; Acid rain; Acid deposition; Ammonium; Watersheds; Forests; Nitrates; Water pollution; Literature reviews

The seasonal variation of streamwater chemistry in three forested Mediterranean catchments.

Pinol, J.; Avila, A.; Roda, F.

Language:  English
Descriptors: Spain; Watersheds; Broadleaved evergreen forests;
Abstract: Streamwater chemistry is described for three streams draining undisturbed, evergreen broad-leaved forested catchments on phyllites in NE Spain: two streams with no or negligible flow in summer are located in the Prades massif, and one perennial stream is in the wetter Montseny mountains. Weekly data for a study period of 24 years are provided to (1) describe the seasonal variations in streamwater chemistry, (2) analyse the relationship between stream discharge and solute concentrations using a two-component mixing model and (3) search for patterns of temporal variation in stream solute concentrations after discounting the effects of discharge. At Prades, concentrations of all analysed ions, except NO3(-1), showed marked seasonal variations in stream water, whereas at Montseny only ions related to mineral weathering (HCO3(-1), Na+, Ca2+ and Mg2+) showed strong seasonality. Ion concentrations were more closely dependent on instantaneous discharge at Montseny than at Prades. The residuals of the relationship between solute concentrations and discharge retained a strong seasonality at Prades, but not at Montseny. These differences are related to the major hydrochemical processes that determine the streamwater chemistry at each site. The same processes are probably operative in the three catchments, but are of varying relative importance. At Montseny, the mixing of waters of different chemical composition seems to be the major process controlling streamwater chemistry, although the soilwater end-member composition predicted by the mixing model applied did not match the measured soilwater chemistry. In the drier Prades catchments, the two major hydrochemical processes determining the seasonal variation of streamwater chemistry are (1) the restart of flow after the summer drought, which flushes out the solutes accumulated during the dry period, and (2) the seasonal changes in groundwater chemistry that result from the interplay of water residence time, temperature and CO

Language: English

Descriptors: South eastern states of U.S.A.; Pinus; Forest plantations; Stand establishment; Wetlands; Site preparation; Herbicides; Hardwoods; Water composition and quality; Bottomlands; Clearcutting; Mechanical methods; Burning; Coastal plains


Language: English

Descriptors: Forest management; Water resources; Hardwoods; Wetlands; Water quality


Language: English

Descriptors: Quebec; Watersheds; Streams; Water quality; Organic compounds; Carbon; Concentration; Soil chemistry; Horizons; Leachates; Adsorption; Pans; Woodlands; Forests; Upland areas; Lowland areas; Mineral soils; Vegetation; Lichens; Mosses; Peatlands; Subarctic soils

Language: English

Descriptors: Spain; Watersheds; Quercus ilex; Forests; Rain; Streams; Stream flow; Storms; Water quality; Water content; Stable isotopes; Hydrogen; Oxygen; Variation; Transpiration; Evaporation; Surface layers; Canopy; Mediterranean climate; Catchment hydrology

Abstract: Results are presented of a study of stable hydrogen and oxygen isotopes in rainfall and streamwaters for the Montseny and Prades areas in northeastern Spain: results cover the full year of 1991. The isotopic pattern for rainfall is similar for both areas: there is a wide range in isotopic contents and the results show a strong, near-linear trend, delta(2)H = 7.9 X delta(18)O + 9.8 (N = 59; r(2) = 0.952), the 'local meteoric line'. There is slight curvature to the data which may be related to the sources of water vapour forming the rainfall. Within the streams, the isotopic variability is much less than that of the rainfall although the data lie on, or very near to, the meteoric line. Data for detailed collections during storm events show more scatter than those collected regularly on a fortnightly basis. The event data show a linear feature that conforms to the local meteoric fine. These results indicate that: (1) the main supply of water to the stream stormflow comes from water stored in the catchment prior to the event; (2) waters of more than one isotopic composition reside within the catchment and are transferable to the stream during storm events; (3) the main process of water transfer from the catchment back to the atmosphere comes from transpiration by the trees and (possibly) complete evaporation from the near-surface soil horizons and the tree canopy; (4) the isotopic technique cannot be used for quantitative hydrograph separation in this instance—at least two water types can be present within the catchment at any given time.


Language: English
Abstract: The results of an extensive study of streamwater chemistry during stormflow events, for a montane Mediterranean area, are presented. Four groups of variables are identified as having contrasting behaviour: alkalinity and pH; nitrate and potassium; sulphate and chloride; sodium, calcium and magnesium. The results show a complex pattern of response to flow that can be broadly linked to: (1) antecedent hydrological conditions; (2) rainfall intensity; (3) supplies of water from chemically distinct areas within the catchment. However, comparisons between this study and a parallel one which examined the composition of waters within the catchment, show that it is presently impossible to quantify the relative supplies from each part of the catchment. The findings are reviewed in relation to analogous studies within a European setting and in relation to modelling initiatives.
Howard, R.J.; Allen, J.A.

Language: English

Descriptors: South eastern states of U.S.A.; Wetlands; Forests; Streams; Habitats; Riparian forests; Wildlife; Resource management; Water composition and quality

97 NAL Call. No.: 56.8 SO3
Sulfate retention and release in soils at Panola Mountain, Georgia. Shanley, J.B.

Language: English

Descriptors: Georgia; Ultisols; Soil types (genetic); Forest soils; Mountain soils; Watersheds; Sulfate; Nutrient retention; Spatial variation; Temporal variation; Adsorption; Desorption; Sorption isotherms; Soil organic matter; Iron oxides; Aluminum oxide; Water flow; Surface layers; Subsoil; Soil depth; Acid deposition; Acidification; Water pollution

98 NAL Call. No.: QR1.C78
Survival and distribution of Yersinia enterocolitica in a tropical rain forest stream.
Elias-Montalvo, E.E.; Calvo, A.; Hazen, T.C.

Language: English

Descriptors: Yersinia enterocolitica; Tropical rain forests; Streams; Environmental pollution; Survival

99 NAL Call. No.: QH540.J6
Temporal variation in nitrate and nutrient cations in drainage waters from a deciduous forest.
Foster, N.W.; Nicolson, J.A.; Hazlett, P.W.

Language: English
Abstract: Temporal variations in soil solution and stream chemistry were examined in 1984 in an undisturbed sugar maple-yellow birch (Acer saccharum Marsh.-Betula alleghaniensis Britton) forest in the Turkey Lakes Watershed, Ontario. Nitrate was the dominant anion associated with cation depletion from soil. Nitrogen in precipitation was less important than soil N in the determination of solution chemistry. Growing-season increases in NH+4 and NO-3 in soil solution were greatest in the Oe horizon and decreased with depth. Nitrate concentrations in mineral soil solution and streamwater were highest during the dormant period and peaked at the start of spring snowmelt. Although NO-3 concentrations in streamwater were positively correlated (r = 0.7-0.9) with NO-3 and Ca2+ concentrations in mineral soil solution during the dormant period, NO-3 contributed far less to cation fluxes in streamwater than HCO-3 or SO(2/4).

Language: English

Descriptors: England; Pinus; Quercus; Alnus; Picea; Rain; Water quality; Chemicals; Throughfall; Soil water; Forest litter; Canopy; Acidity

Abstract: A study was made of the changes and variation in the chemistry of rainwater passing through the different strata of separate ecosystems of four tree species (oak, alder, spruce and pine) on the same site at Gisburn (Bowland Forest), north-west England. Waters were sampled as rain, throughfall, forest-floor leachate and soil waters from both the A and B/C horizons; and analysed for NH4-N, NO3-N, PO4-P, K, Ca, Mg, Na, Al, SO4-S, Cl, total organic carbon and pH. Species differences--often marked ones--appear to exist in the concentrations of most solutes in most strata. The between-species differences in throughfall chemistry provide little guide to the chemistry of waters lower down the profile: the forest floor is a particularly important source of further species differences, e.g. variation in NO3 production and the resulting effects on acidity and other ions. The chemistry of the soil waters provides some indication of possible drainage losses, although the question of which horizon acts as the source of drainage waters on this site remains unanswered. The levels of H and Al, in particular, are very different between the upper mineral soil (A horizon) and the lower B/C horizon. In general, and based on these concentration data only, oak is associated with smallest potential solute losses, pine the greatest.

103 NAL Call. No.: 292.8 W295


Language: English

Descriptors: Norway; Soil water movement; Streams; Surface water; Water flow; Soil solution; Soil types; B horizons; Aluminum; Exchangeable cations; Soil chemistry; Catchment hydrology; Acid rain; Acidification; Spatial distribution

Abstract: The dynamic pattern of soil water transport is a major factor in determining the chemistry of streamwater. In the acidified Birkenes catchment (southernmost Norway) the streamwater chemistry is, to a first approximation, explained
by mixing solutions from the forest floor, the B horizon and the deep peat, in various proportions depending on the hydrological conditions. Paradoxically, a direct physical contact between the forest floor and the B horizon on the one hand and the stream on the other is lacking, as the stream banks largely consist of peats. To investigate this paradox, soils and their levels of exchangeable cations were studied in a 100 m X 100 m grid. Results indicate that the exchange sites of the surface peat along the stream are significantly enriched in Al, probably due to return flow of Al-rich B horizon water. This view is supported by the similarity of the solution chemistry in surface peats and B horizons. Exchangeable base cations dominate in the forest floor upslope. Forest floor solutions, an important component of streamwater during intensive storms, are depleted in Al and may bypass the Al-enriched surface peats via ephemeral flow channels. A parallel study in a pristine catchment in mid-Norway shows a similar accumulation of Al in return flow areas. This indicates that acid deposition is not a prerequisite for elevated levels of exchangeable Al in the surface organic layers of return flow areas.
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37 C.F.R. 201.14

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