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Simulation Models, GIS and Nonpoint-Source Pollution (II)

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by
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SIMULATION MODELS, GIS AND NONPOINT-SOURCE POLLUTION (II)

1. An agricultural chemical evaluation and management system.
Haan, C. T.; Nofziger, D. L.; Gregory, M.

J-agric-eng-res v.56, p.301-312. (1993).
Includes references.
Descriptors: agricultural-chemicals; movement-in-soil; groundwater-pollution; simulation-models; geographical-information-systems; evaluation-; management-; systems-; oklahoma-
Abstract: An Agricultural Chemical Evaluation and Management System (AGCHEMS), has been developed to investigate the impact of various agricultural chemical management scenarios on the movement of these chemicals toward groundwater. AGCHEMS was

developed by integrating a chemical transport model (CMLS), a weather simulation model (WGEN), and a geographical information system (GIS). AGCHEMS can evaluate the effect of chemical application rate and timing, the particular chemical used, and other management practices such as the amount and timing of irrigation water. These factors affect the time and amount of the chemical that will reach selected depths in the soil profile. The GIS allows site specific soil information to be used in the model. The GIS can also be used to prepare maps showing the vulnerability of areas to exceed selected standards of chemical movement. Uncertainty in the exact values of soil and chemical properties and variability in weather sequences can also be evaluated and maps generated showing the probability of exceeding various amounts of chemical passing preselected depths in the soil profile. The results obtained using possible and equally likely weather sequences show considerable variability in chemical movement due to weather alone. The implications of this variability upon monitoring programmes, the interpretation of model studies, and possible regulations on use of agricultural chemicals are discussed.

NAL Call No.: 58.8-J82

2. Alternating extraction/injection well interactions for in situ bioremediation.

Shouche, M. S.; Petersen, J. N.; Skeen, R. S.; Hooker, B. S.

Appl-biochem-biotechnol. Totowa, N.J. : Humana Press. Spring 1994. v. 45/46 p. 775-785.

Paper presented at the "Fifteenth Symposium on Biotechnology for Fuels and Chemicals," May 10-14, 1993, Colorado Springs, Colorado.

Descriptors: bioremediation-; bacteria-; microbial-degradation; carbon-tetrachloride; biomass-; spatial-distribution; groundwater-flow; groundwater-pollution; wells-; mathematical-models

NAL Call No.: QD415.A1J62

3. Analyses of slope and runoff factors based on the WEPP erosion model.

Huang, C.; Bradford, J. M.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Sept/Oct 1993. v. 57 (5) p. 1176-1183.

Includes references.

Descriptors: water-erosion; geological-sedimentation; mathematical-models; equations-; mathematics-; slope-; runoff-; sediment-; losses-from-soil; areas-; water-erosion-prediction-process; rill-and-interrill-areas

Abstract: Under process-based erosion model development, the source of sediment transported off a field is separated into that from interrill and rill areas, and separate detachment equations are developed. Limitation of this spatial separation is that, in many conditions, rill and interrill areas are not clearly defined a priori. We interpreted the erosion and deposition equations used in the current Water Erosion Prediction Project (WEPP) in an alternative fashion such that spatial separation of rill and interrill areas is no longer

required. Analytic solutions were derived for the WEPP erosion and deposition equations under general conditions. Simplified solutions for a specific case, uniform rain on uniform slope, were examined closely for slope and runoff effects on sediment delivery. Under both erosion and deposition conditions, analytic solutions show a linear relationship between sediment yield, q_s and slope, S . The dependency of q_s on runoff, q_w , is either linear or quadratic depending on whether the system is dominated by an erosion or deposition regime. These analytic findings explain results obtained from laboratory studies in which sediment yield was collected under variable slope and rain intensities.

NAL Call No.: 56.9-So3

4. Analytical models of steady state organic species transport in the vadose zone with kinetically controlled volatilization and dissolution.

Zaidel, J.; Russo, D.

Water-resour-res v.29, p.3343-3356. (1993).

Includes references.

Descriptors: soil-pollution; volatile-compounds; transport-processes; volatilization-; dissolving-; kinetics-; mathematical-models; unsaturated-zone; steady-state-flow

Abstract: Kinetically controlled volatilization and dissolution of nonaqueous phase liquids (NAPLs) may play an important role in the transport of volatile compounds in the unsaturated (vadose) zone. In this study, some one- and two-dimensional steady state transport problems are solved analytically. The one-dimensional case is pertinent to pollution by a relatively long, mainly horizontally spread leak of NAPL. The two-dimensional case corresponds to situations in which the pollution spreads primarily vertically, originating at the ground surface and migrating to the top of the capillary fringe, and in which the solution domain may be represented by a cross-sectional model. Solutions of the steady state transport problems are used to investigate effects of several parameters, characterizing the advective-dispersive and purely diffusive transport regimes, on the NAPL concentration distribution for the one- and two-dimensional cases, respectively. Results of this analysis indicate that the mass exchange between NAPL and other phases may not reach equilibrium, even for relatively large mass transfer rate coefficients and small water infiltration rates, if this zone has relatively small vertical or horizontal extent and is located close to the fully open ground surface. Analysis of local volatilization and dissolution fluxes shows that, under equilibrium conditions, the main losses of the organic phase take place at the upper part of the NAPL zone.

NAL Call No.: 292.8-W295

5. Analytical solutions for non-equilibrium solute transport in three-dimensional porous media.

Leij, F. J.; Toride, N.; Van Genuchten, M. T. v.

J-hydrul v.151, p.193-228. (1993).

Includes references.

Descriptors: soil-water-movement; solutes-; transport-processes;

porous-media; flow-; mathematical-models; unidirectional-flow
Abstract: The movement of water and chemicals in soils is generally better described with multidimensional nonequilibrium models than with more commonly used one-dimension and/or equilibrium models. This paper presents analytical solutions for non-equilibrium solute transport in semi-infinite porous media during steady unidirectional flow. The solutions can be used to model transport in porous media where the liquid phase consists of a mobile and an immobile region (physical non-equilibrium) or where solute sorption is governed by either an equilibrium or a first-order rate process (chemical non-equilibrium). The transport equation incorporates terms accounting for advection, dispersion, zero-order production, and first-order decay. General solutions were derived for the boundary, initial, and production value problems with the help of Laplace and Fourier transforms. A comprehensive set of specific solutions is presented using Dirac functions for the input and initial distribution, and/or Heaviside or exponential functions for the input, initial, and production profiles. A rectangular or circular inflow area was specified for the boundary value problem while for the initial and production value problems the respective initial and production profiles were located in parallelipedal, cylindrical, or spherical regions of the soil. Solutions are given for both the volume-averaged or resident concentration as well as the flux-averaged or flowing concentration. Examples of concentration profiles versus time and effects of non-equilibrium on three-dimensional transport are very similar to those for one-dimensional transport.

NAL Call No.: 292.8-J82

6. Answer-2000: a model for agricultural pollution control planning in the USA and the Ukraine.

Dillaha, T. A. I.; Bouraoui, F.; Kolpak, V. Z.; Beasley, D. B.; Platonova, G. Y.

Proceedings of Industrial and Agricultural Impacts on the Hydrologic Environment the Second USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology / USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology. Alexandria, VA : Water Environment Federation, c1993.. v. 2 p. 165-178.

Title on cover : Environmental impact of agricultural practices and agrichemicals / edited by Y. Eckstein and A. Zaporozec.

Descriptors: agricultural-production; pollution-; control-; water-quality; planning-; models-; usa-; ukraine-

NAL Call No.: GB652.U82-1993

7. Application of a GIS-based nonpoint source nutrient loading model for assessment of land development scenarios and water quality in Owasco Lake, New York.

Heidtke, T. M.

Water-sci-technol v.28, p.595-604. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: lakes-; water-quality; phosphorus-; loads-;

water-pollution; models-; geographical-information-systems;
land-use; new-york

NAL Call No.: TD420.A1P7

8. The application of CREAMS model to forecasting the nitrate and chloride leaching from grassland.

Sapek, B.; Sapek, A.

Water-sci-technol v.28, p.649-658. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: permanent-grasslands; groundwater-pollution; nitrates-; chlorides-; leaching-; simulation-models; forecasting-; poland-

NAL Call No.: TD420.A1P7

9. Application of geographic information systems in hydrology and water resources management : proceedings of an international conference held in Vienna, Austria, from 19 to 22 April 1993 :

this conference was jointly organized by the International Commission on Groundwater of the International Association of Hydrological Sciences (IAHS), the United Nations Educational, Scientific and Cultural Organization (UNESCO) - as a contribution to subprogramme M-2-3 of UNESCO's IHP-IV, Universitat fur Bodenkultur, Vienna.

Kovar, K.; Nachtnebel, H. P.; International Association of Hydrological Sciences.

Wallingford : International Association of Hydrological Sciences, 1993. xi, 693 p. : ill., maps.

Includes bibliographical references.

Descriptors: Geographic-information-systems-Congresses; Hydrology-Data-processing-Congresses;

Water-resources-management-Data-processing-Congresses

NAL Call No.: G70.2.A77--1993

10. Application of GLEAMS to predict nutrient losses from land application of poultry litter.

Yoon, K. S.; Yoo, K. H.; Wood, C. W.; Hall, B. M.

Trans-ASAE v.37, p.453-459. (1994).

Includes references.

Descriptors: poultry-manure; runoff-; nitrogen-; phosphorus-; water-quality; simulation-models; alabama-; groundwater-loading-effects-of-agricul; -manage; -systems

Abstract: The GLEAMS (Groundwater Loading Effects of Agricultural Management System) (version 2.1) water quality model was used to predict nutrient (N and P) losses in surface and subsurface runoff, and their concentrations in soil layers, following application of two rates (9 and 18 t ha⁻¹) of poultry litter and a recommended rate of a commercial fertilizer on conventionally tilled corn plots at the Tennessee Valley Substation of the Alabama Agricultural Experiment Station. Model simulation results were compared with field data. The experiment included four replications for each of the three soil-amendment treatments. The GLEAMS simulation of soluble and sediment P losses in surface

runoff and NO₃-N concentrations in leachate and soil layers were not consistent with field data. Simulation of N-transformation effects on N losses in surface runoff did not agree with field data. The model simulated higher NH₄-N than NO₃-N losses in surface runoff, while field data showed the opposite. The model simulated low concentrations of P in leachate at a 1.0 m depth, while the observed data showed large variations.

NAL Call No.: 290.9-Am32T

11. Assessing the movement of agricultural chemicals through the soil profile at the Ohio management systems evaluation area. Workman, S. R.; Ward, A. D.; Knisel, W. G.

Proceedings of Industrial and Agricultural Impacts on the Hydrologic Environment the Second USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology / USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology. Alexandria, VA : Water Environment Federation, c1993.. v. 2 p. 145-158.

Title on cover : Environmental impact of agricultural practices and agrichemicals / edited by Y. Eckstein and A. Zaporozec.

Descriptors: zea-mays; glycine-max; triticum-aestivum; vicia-villosa; atrazine-; alachlor-; metribuzin-; movement-in-soil; prediction-; simulation-models; leaching-; contamination-; ohio-

NAL Call No.: GB652.U82-1993

12. Assessment of pollution of groundwater by atrazine. Kuhnt, G.; Franzle, O.

Land-degrad-rehabil v.4, p.245-251. (1993).

Special Issue on the June 1992 Conference of the Society for Environmental Toxicology and Chemistry (SETAC) / edited by G.P. Hekstra, E. Ivanova and J.H. Weverling.

Descriptors: atrazine-; groundwater-pollution; risk-; monitoring-; soil-types; simulation-; models-; germany-

NAL Call No.: S622.L26

13. Automated extraction of drainage network and watershed data from digital elevation models.

Martz, L. W.; Garbrecht, J.

Water-resour-bull v.29, p.901-908. (1993).

Includes references.

Descriptors: drainage-; overland-flow; runoff-; watersheds-; hydrological-data; algorithms-; computer-software; geomorphology-; oklahoma-;

digital-elevation-drainage-network-model-dednm

Abstract: This paper discusses a computer program which extracts a number of watershed and drainage network properties directly from digital elevation models (DEM) to assist in the rapid parameterization of hydrologic runoff models. The program integrates new and established algorithms to address problems inherent in the analysis low-relief terrain from raster DEMs similar to those distributed by the U.S. Geological Survey for 7.5-minute quadrangles. The program delineates the drainage network from a DEM, and determines the Strahler order, total and

direct drainage area, length, slope, and upstream and downstream coordinates of each channel link. It also identifies the subwatershed of each channel source and of the left and right bank of each channel link, and assigns a unique number to each network node. The node numbers are used to associate each subwatershed with the channel link to which it drains, and can be used to control flow routing in cascade hydrologic models. Program output includes tabular data and raster maps of the drainage network and subwatersheds. The raster maps are intended for import to a Geographical Information System where they can be registered to other data layers and used as templates to extract additional network and subwatershed information.

NAL Call No.: 292.9-Am34

14. Axisymmetric transport of water and solute underneath a disk
Quadri, M. B.; Clothier, B. E.; Angulo Jaramillo, R.; Vauclin, M.; Green, S. R.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1994. v. 58 (3) p. 696-703.

Includes references.

Descriptors: water-flow; solutes-; movement-in-soil;

transport-processes; unsaturated-flow; permeability-

Abstract: No analytical solution exists for two-dimensional, axisymmetric flow of both water and solute underneath a disk permeameter. We developed a finite-difference numerical scheme for such flows. Laboratory experiments were also conducted using a box containing repacked sand. A 1/4-sector disk permeameter was located on the surface in one corner. The disk, first containing pure water, was placed on the soil for 200 s. It was then removed, refilled with a KBr solution, and replaced at 225 s. Finally after 12.5 min the disk was removed and soil samples extracted along three radial transects under the disk. In two other experiments, the disk, containing only pure water, was left on the soil surface and soil samples removed at the end i.e., 6 and 14 min. A tensiometer inserted through one face of the box and located just 20 mm under the disk recorded the changing soil water pressure head with time, $h(t)$. Good predictions of both the water content and $Br(-)$ profiles were achieved with the numerical model, and good renditions of $h(t)$ and the transient flow rate from the disk, $q(t)$. Our results reinforce the need for caution when determining the soil's sorptivity from observations of q vs $t(1/2)$. Care is required in deciding when q has indeed become steady. Numerical models, such as this one might serve as parameter-identification tools when using a tracer-filled disk permeameter to infer the chemical transport properties of soil.

NAL Call No.: 56.9-So3

15. Broiler litter application to land in an agricultural watershed: A GIS approach.

Xu, F.; Prato, T.; Fulcher, C.

Water-sci-technol v.28, p.111-118. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: broilers-; poultry-manure; application-to-land;

agricultural-land; watersheds-; application-rates;
economic-evaluation; water-pollution; prediction-; optimization-;
models-; geographical-information-systems; missouri-
NAL Call No.: TD420.A1P7

16. Calculating critical loads for acidity with the simple mass
balance method.

Sverdrup, H.; Vries, W. de.

Water-air-soil-pollut v.72, p.143-162. (1994).

Includes references.

Descriptors: acid-deposition; forest-soils; polluted-soils;
groundwater-pollution; soil-pollution; water-pollution; acidity-;
soil-acidity; alkalinity-; soil-alkalinity; balance-studies;
mathematical-models; equations-; sweden-; netherlands-

NAL Call No.: TD172.W36

17. CELMOD5--a semi-distributed cell model for conversion of
rainfall into runoff in semi-arid watersheds.

Karnieli, A. M.; Diskin, M. H.; Lane, L. J.

J-hydrol v.157, p.61-85. (1994).

Includes references.

Descriptors: watersheds-; rain-; storms-; runoff-;
catchment-hydrology; forecasting-; floods-; semiarid-climate;
simulation-models

Abstract: This paper introduces the general outline of CELMOD5, a
parametric, semi-distributed, quasi-linear model, for conversion
of rainfall into surface runoff. The model considers the
watershed as a series of interconnected cell units, each
representing a specific portion of the area of the watershed. In
contrast to grid models using a large number of rectangular
elements or cells, the number of cells in CELMOD is relatively
small and their boundaries are chosen according to the watershed
topography. For each cell, the program computes the surface
runoff hydrograph at the cell outlet, related to a specified
record of total rainfall data at a number of rain gages. If
measured surface runoff data are available for some locations in
the watersheds, the program can compare these data with computed
values of surface runoff at the corresponding points of the cell
model. Detailed descriptions are provided for the main model
procedures--computation of rainfall excess, conversion of
rainfall excess into surface outflow, routing the channel inflow
and subtraction of channel losses. Special attention is given in
this model to the specific conditions of arid or semi-arid
watersheds. This paper is also concerned with a technique for
calibrating and testing a forecasting model of storm hydrographs
with emphasis on two objective functions--runoff volume and peak
discharge. A method for evaluation procedure is presented based
on the following five steps: trial and error calibration;
sensitivity analysis; bilinear interpolation optimization,
testing the model on different storm events; testing the model on
a different watershed. Results are presented for all the larger
storm events with reliable. Experimental Watershed in
southeastern Arizona. The evaluation procedure is demonstrated
for one particular rainfall-runoff event.

NAL Call No.: 292.8-J82

18. Chloride migration in heterogeneous soil. 2. Stochastic modeling.

Destouni, G.; Sassner, M.; Jensen, K. H.

Water-resour-res v.30, p.747-758. (1994).

Includes references.

Descriptors: transport-processes; chloride-; prediction-; stochastic-models

Abstract: The observed statistics of chloride breakthrough presented by Sassner et al. (this issue) were compared with predictions of a stochastic-advective modeling approach. The stochastic-advective model based on the observed spatial distribution of flow rates and on transport parameters consistent with parameter values obtained from local breakthrough curves (BTCs) agreed well with the observations. Alternative models that agreed well with the local BTCs failed to predict the large-scale BTC with realistic parameter values. The results support the assumption that compared to advection variability, local dispersion within the mobile water will often have a second-order effect on field scale solute transport. The stochastic-advective model is robust with regard to the rate of mass transfer between mobile and immobile water zones. This robustness implies that order of magnitude estimates may be sufficient for providing useful predictions of both field scale solute transport and the associated prediction uncertainty. In contrast, accurate estimation of the statistics of solute advection at the scale of interest for the transport problem is necessary.

NAL Call No.: 292.8-W295

19. Climate change impact on distribution and abundance of wildlife species: an analytical approach using GIS.

Aspinall, R.; Matthews, K.

Environ-pollut v.86, p.217-223. (1994).

Includes references.

Descriptors: climatic-change; wildlife-; habitats-; geographical-distribution; climatic-factors; geographical-information-systems; scotland-; species-distribution

NAL Call No.: QH545.A1E52

20. Comments on "Boundary Conditions for Displacement Experiments through Short Laboratory Soil Columns".

Shukla, B. S.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1994. v. 58 (3) p. 991-993.

Original article by M.T. van Genuchten and J.C. Parker published in Soil Science Society of America Journal, 48(4), p. 703-708.

Reply by M.T. van Genuchten and J.C. Parker, p. 991-993.

Descriptors: solutes-; transport-processes; movement-in-soil; mathematical-models; diffusion-

NAL Call No.: 56.9-So3

21. Comparison of PRZM computer model predictions with field lysimeter data for dichlorprop and bentazon leaching.

Mueller, T. C.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1183-1195.
(1994).

Special Issue on the Evaluation and Comparison of Pesticide
Leaching.

Descriptors: dichlorprop-; bentazone-; leaching-;
simulation-models; prediction-; sandy-soils;
pesticide-root-zone-model

NAL Call No.: TD172.J6

22. A comprehensive set of analytical solutions for
nonequilibrium solute transport with first-order and zero-order
production.

Toride, N.; Leij, F. J.; Van Genuchten, M. T.

Water-resour-res v.29, p.2167-2182. (1993).

Includes references.

Descriptors: transport-processes; solutes-; flow-; sorption-;
kinetics-; mathematical-models; subsurface-layers;
nonequilibrium-transport-models; semi-infinite-soil-systems

Abstract: Solute transport in the subsurface is often considered
to be a nonequilibrium process. Predictive models for
nonequilibrium transport may be based either on chemical
considerations by assuming the presence of a kinetic sorption
process, or on physical considerations by assuming two-region
(dual-porosity) type formulations which partition the liquid
phase into mobile and immobile regions. For certain simplifying
conditions, including steady state flow and linear sorption, the
chemical and physical nonequilibrium transport models can be cast
in the same dimensionless form. This paper presents a
comprehensive set of analytical solutions for one-dimensional
nonequilibrium solute transport through semi-infinite soil
systems. The models involve the one-site, two-site, and
two-region transport models, and include provisions for
first-order decay and zero-order production. General solutions
are derived for the volume-averaged (or resident) solute
concentration using Laplace transforms assuming both first- and
third-type inlet conditions, and arbitrary initial conditions,
input solute concentrations, and solute production profiles. The
solutions extend and generalize existing solutions for
equilibrium and nonequilibrium solute transport. The general
solutions are evaluated for some commonly used input and initial
conditions, and zero-order production profiles. Expressions for
the flux-averaged concentration are derived from the general and
specific solutions assuming a third-type inlet condition. Typical
examples of calculated concentration distributions resulting from
several sets of initial and input conditions and zero-order
production functions are also presented and briefly discussed.

NAL Call No.: 292.8-W295

23. The conceptual framework for the National Pilot Project on
Livestock and the Environment. Livestock series report 2.

Bouzaher, A.; Johnson, S. R.; Neibergs, S.; Jones, R.; Beran, L.;
Frarey, L.; Hauck, L.

Staff-rep-Iowa-State-Univ,-Cent-Agric-Rural-Dev. Ames, Iowa :
Center for Agricultural and Rural Development, 1986-. Dec 1993.

(93-SR67) 34 p.

Includes references.

Descriptors: animal-feeding; livestock-;
environmental-assessment; pilot-projects; water-quality;
waste-disposal; models-; usa-; texas-; erath-county,-texas

NAL Call No.: HD1401.S75

24. A daily runoff simulation in semi-arid watersheds based on soil water deficit calculations.

Karnieli, A.; Ben Asher, J.

J-hydrol v.149, p.9-25. (1993).

Includes references.

Descriptors: watersheds-; soil-water-content; water-deficit;
runoff-; storms-; semiarid-zones; simulation-models; arizona-
Abstract: Initial soil water content just before a rainfall event is an input required for the calculation of a basin's water balance including infiltration and runoff. However, for most watersheds such information is not available because its evaluation involves a large amount of labor. The objective of this study is to describe a practical model with which to estimate time-dependent changes of a basins soil water content. It is further used for predicting runoff water yield when rainfall depth is the only known component of the water balance equation (WBE). Two distinct cases of the WBE are discussed: (1) a runoff-producing storm; (2) a storm without runoff. Runoff events from four watersheds in southern Arizona were measured throughout 8 to 17 years and analyzed in this study. Rainfall-runoff relationships are described in this model by an empirical quadratic regression equation which includes four parameters. They were estimated by an optimization subroutine which was used to determine the minimum difference between measured and modeled results. The optimized parameters enable simulations of the continuous dynamic change of an index of the soil water content as well as predictions of runoff depths. It was found that the predicted runoff agrees reasonably well with the observed runoff. The minimum coefficient of determination (r^2) between the computed and actual runoff for the multi-annual data sets was 0.62 and the maximum 0.86. Runoff threshold value was found to be a function of the basin average soil texture. The lowest threshold was 4.6 mm for clay soil and the largest was 9.0 mm for sandy soil. Since direct soil water measurements were not taken, we interpreted the acceptable agreement between measured and predicted runoff as an indirect validation of the soil water model. It is. simulated runoff on nearby ungaged watersheds in semi-arid regions.

NAL Call No.: 292.8-J82

25. Darcy-Weisbach roughness coefficients for selected crops.

Gilley, J. E.; Kottwitz, E. R.

Trans-ASAE v.37, p.467-471. (1994).

Includes references.

Descriptors: zea-mays; gossypium-hirsutum; hordeum-vulgare;
glycine-max; helianthus-annuus; triticum-aestivum; runoff-;
hydraulic-resistance; hydrology-; models-

Abstract: Total hydraulic resistance on an upland agricultural

site may be influenced by several factors including standing vegetation. In this laboratory study, Darcy-Weisbach roughness coefficients were measured for corn, cotton, sorghum, soybeans, sunflower, and wheat vegetation. Experimental variables used in this investigation in addition to crop type included plant population, row spacing, row orientation, and flow rate. For some of the experimental tests, a single row of vegetation was oriented within a flume parallel to the principal flow direction. For the remainder of the tests, rows of vegetation were placed perpendicular to the flow using row spacings and plant populations recommended by crop management specialists. Measurements of discharge rate and flow velocity were used to calculate roughness coefficients for Reynolds number values ranging from approximately 550 to 22,000. Regression equations which relate roughness coefficients to plant population, row spacing, and Reynolds number were developed from the laboratory data. With the exception of wheat placed perpendicular to flow, roughness coefficients produced by standing vegetation were negligible. On upland agricultural areas, total hydraulic roughness will be influenced primarily by frictional drag over the soil surface, and residue and ground cover.

NAL Call No.: 290.9-Am32T

26. A decision support system for evaluating the effects of alternative farm management systems on water quality and economics.

Yakowitz, D. S.; Stone, J. J.; Lane, L. J.; Heilman, P.; Masterson, J.; Abolt, J.; Imam, B.

Water-sci-technol v.28, p.47-54. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: water-quality; farm-management; systems-; decision-making; support-systems; farm-income; simulation-models; arizona-

NAL Call No.: TD420.A1P7

27. Determination of traveltime in the Delaware River, Hancock, New York, to the Delaware Water Gap by use of a conservative dye tracer.

White, K. E.; Kratzer, T. W.; Delaware River Basin Commission.

Lemoyne, Pa. : U.S. Dept. of the Interior, U.S. Geological Survey ; Denver, Colo. : U.S. Geological Survey, Earth Science Information Center, Open-File Reports Section [distributor], 1994. vi, 54 p. : ill., maps.

Shipping list no.: 94-0223-P.

Descriptors: Streamflow-Delaware-River-N; Y; -Del; -and-N; J; -Mathematical-models; Water-quality-Delaware-River-N; Y; -Del; -and-N; J; -Measurement

NAL Call No.: GB701.W375--no.93-4203

28. Determining off-site concentrations of volatile pesticides using the trajectory-simulation model.

Yates, S. R.

J-environ-qual v.22, p.481-486. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research Center Symposium XVII, "Agricultural Water Quality Priorities, A Team Approach to Conserving Natural Resources," May 4-8, 1992, Beltsville, MD.

Descriptors: pesticides-; volatilization-; atmosphere-; losses-from-soil; transport-processes; simulation-models; environmental-fate-models

Abstract: An environmental transport model is described and illustrated that will enable the prediction of the mass and/or concentration of volatile pesticides at any depth in the soil profile and at any height in the atmosphere relatively far distanced downwind from agricultural fields. The theoretical profile shape model is used to determine transport in the atmosphere and is coupled to the behavior assessment model (BAM) to describe transport in soils. The model outputs include the soil-water concentrations, the surface volatilization rate, the concentration of pesticides in the atmosphere above the field, and the atmospheric concentration at specified distances downwind from the field. The results from this approach can be used in exposure assessment studies to determine the risk for individuals living near agricultural fields.

NAL Call No.: QH540.J6

29. Determining parameter precision for modeling nitrate leaching: inorganic fertilization in Nordic climates.

Larocque, M.; Banton, O.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Mar/Apr 1994. v. 58 (2) p. 396-400.

Includes references.

Descriptors: nitrate-; leaching-; deterministic-models; fertilizers-; inorganic-compounds; movement-in-soil; edaphic-factors; biological-activity-in-soil; cold-zones; nitrogen-cycle

Abstract: Most NO₃- leaching models require the quantification of many parameters. Because the majority of these parameters are difficult to estimate, it is important to know the impact of parameter imprecision to make proper use of a model. A study was performed to identify the relative influence of the parameters in a deterministic NO₃- leaching model (SOILN) used with inorganic fertilization in nordic climates. A sensitivity analysis of the model was performed using parameters related to the N cycle with two reference systems for the parameters corresponding to field sites located in Quebec and in southern Sweden. Results from both sites showed that atmospheric deposits had little influence on NO₃- leaching in agricultural areas in Quebec and Sweden; the variation of parameters related to nitrification also had little impact on NO₃- leaching at the sites studied; parameters used for mineralization, plant uptake, and denitrification had a significant impact on NO₃- leaching in the simulated conditions; parameters related to abiotic factors had a variable influence, depending mostly on soil water contents.

NAL Call No.: 56.9-So3

30. Determining the green-Ampt effective hydraulic conductivity from rainfall-runoff data for the WEPP model.

Risse, L. M.; Nearing, M. A.; Savabi, M. R.

Trans-ASAE v.37, p.411-418. (1994).

Includes references.

Descriptors: rain-; runoff-; erosion-; hydraulic-conductivity;
hydrology-; models-; water-erosion-prediction-project

Abstract: The Green-Ampt infiltration equation is used in many different hydrologic models. The effective hydraulic conductivity parameter (Ke) within this equation is needed to obtain reliable estimates of infiltration and runoff. In this study, a method was developed for calibrating Ke for the Green-Ampt equation as integrated with the WEPP continuous simulation model using a series of rainfall-runoff events on natural runoff plots. Optimum values of Ke were obtained at seven locations, and the average Nash-Sutcliffe model efficiency for the Green-Ampt/Wepp predictions of runoff on an event basis was 0.46 using these Ke values. Green-Ampt/WEPP tended to overpredict runoff on the small events and underpredict runoff on the larger events. This bias could not be corrected through calibration and indicates a structural flaw in the Green-Ampt equation, the WEPP model, or the available data. Other estimates of effective hydraulic conductivity were obtained from five different parameter estimation methods based on relationships involving common soil properties and were used in the Green-Ampt/Wepp model to predict runoff at each of the locations. None of these methods of estimating the effective hydraulic conductivity consistently outperformed the others for all the data sets. The average Nash-Sutcliffe model efficiency obtained using the best estimated parameters was -0.16, indicating that considerable improvement was obtained with calibration.

NAL Call No.: 290.9-Am32T

31. Development, description, and application of a geographic information system data base for water resources in karst terrane in Greene County, Missouri.

Waite, L. A.; Thomson, K. C.; Geological Survey (U.S.).

Rolla, Mo. : U.S. Geological Survey ; Denver, Colo. : Earth Science Information Center, Open-File Reports Section [distributor], 1993. vi, 31 p. : ill., maps (some col.).
Shipping list no.: 93-0640-P.

Descriptors: Geographic-information-systems;
Water-Pollution-Missouri-Greene-County-Data-bases;
Groundwater-Pollution-Missouri-Greene-County-Data-bases;
Karst-Missouri-Greene-County; Hydrogeology-Missouri-Greene-County
NAL Call No.: GB701.W375-no.93-4154

32. Development of a non-isothermal method for determination of diffusional parameters.

Moreira, L. A.; Oliveira, F. A. R.; Silva, T. R.; Oliveira, J. C.

Int-j-food-sci-technol v.28, p.575-586. (1993).

Includes references.

Descriptors: turnips-; food-processing; acidification-;
blanching-; leaching-; diffusivity-; temperature-;
diffusion-models; mathematical-models; fick's-second-law

NAL Call No.: TP368.J6

33. Development of steady-state diffusion gradients for the cultivation of degradative microbial consortia.

Wolfaardt, G. M.; Lawrence, J. R.; Hendry, M. J.; Robarts, R. D.; Caldwell, D. E.

Appl-environ-microbiol v.59, p.2388-2391. (1993).

Includes references.

Descriptors: microorganisms-; groundwater-; microbial-degradation; diclofop-; isolation-techniques; cell-culture; gels-; bioreactors-; diffusion-; gradients-; groundwater-pollution; simulation-models

Abstract: A diffusion gradient plate was constructed and evaluated for its potential use in the isolation of degradative microbial consortia from natural habitats. In this model, a steady-state concentration gradient of diclofop methyl, established by diffusion through an agarose gel, provided the carbon for microbial growth. Colonization of the gel surface was observed with epifluorescence and scanning confocal laser microscopy to determine microbial responses to the diclofop gradient. A detectable gradient developed over a narrow band (< 10 mm). Consequently, quantitative analyses of the microbial response to the gradient were difficult to obtain. A two-dimensional, finite-element numerical transport model for advective-diffusive transport was used to simulate concentration and flux profiles in the physical model. The simulated profiles were correlated with the measured concentration gradient (R2 = 0.89) and the cell numbers on the gel surface (R2 = 0.85). The numerical model was subsequently used to redesign the physical model. The detectable concentration gradient in the modified physical model extended over the length of the gel (38 mm). The simulated profile again showed a good correlation with the measured profile (R2 = 0.96) and the microbial responses to the concentration gradient (R2 = 0.99). It was concluded that these gradients provide the steady-state environments needed to sustain steady-state consortia. They also provide a physical pathway for the development of degradative biofilms from low to high concentrations of toxicants and simulate conditions under which low concentrations of toxicant are supplied at a constant flux over long periods of time, such as the conditions that could occur in natural environments.

NAL Call No.: 448.3-Ap5

34. Digital data acquisition and development of geographic information system coverages for use with the public water-supply wells and springs in Tennessee.

Connell, J. F.; Barron, W. R.; Tennessee. Division of Water Supply.

Nashville, Tenn. : U.S. Dept. of the Interior, U.S. Geological Survey ; Denver, Colo. : U.S. Geological Survey Books and Open-File Reports Section, distributor, 1993. iii, 28 p. : maps. Shipping list no.: 93-0483-P.

Descriptors: Groundwater-Tennessee-Data-bases; Hydrogeology-Tennessee-Data-bases; \$

NAL Call No.: GB701.W375-no.92-4178

35. A distributed hydrology-vegetation model for complex terrain.
Wigmosta, M. S.; Vail, L. W.; Lettenmaier, D. P.

Water-resour-res v.30, p.1665-1679. (1994).

Includes references.

Descriptors: runoff-; catchment-hydrology; vegetation-;
simulation-models; canopy-penetration; evapotranspiration-;
snow-cover; meltwater-; topography-; mountain-areas;
spatial-distribution; montana-

Abstract: A distributed hydrology-vegetation model is described that includes canopy interception, evaporation, transpiration, and snow accumulation and melt, as well as runoff generation via the saturation excess mechanisms. Digital elevation data are used to model topographic controls on incoming solar radiation, air temperature, precipitation, and downslope water movement. Canopy evapotranspiration is represented via a two-layer Penman-Monteith formulation that incorporates local net solar radiation, surface meteorology, soil characteristics and moisture status, and species-dependent leaf area index and stomatal resistance. Snow accumulation and ablation are modeled using an energy balance approach that includes the effects of local topography and vegetation cover. Saturated subsurface flow is modeled using a quasi three-dimensional routing scheme. The model was applied at a 180-m scale to the Middle Fork Flathead River basin in northwestern Montana. This 2900-km(2), snowmelt dominated watershed ranges in elevation from 900 to over 3000 m. The model was calibrated using 2 years of recorded precipitation and streamflow. The model was verified against 2 additional years of runoff and against advanced very high resolution radiometer based spatial snow cover data at the 1-km(2) scale. Simulated discharge showed acceptable agreement with observations. The simulated areal patterns of snow cover were in general agreement with the remote sensing observations, but were lagged slightly in time.

NAL Call No.: 292.8-W295

36. The distributed modelling of agricultural nonpoint pollution at basin

Preti, F.; Lubello, C.

Water-sci-technol v.28, p.669-674. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: agricultural-chemicals; application-; rivers-;
watersheds-; water-pollution; models-; italy-

NAL Call No.: TD420.A1P7

37. Dynamic simulation modelling for evaluating water quality response to agricultural BMP implementation.

Cassell, E. A.; Clausen, J. C.

Water-sci-technol v.28, p.635-648. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: agricultural-land; phosphorus-;

input-output-analysis; movement-in-soil; groundwater-pollution;
surface-water; pollution-; sources-; dynamic-models;
simulation-models; vermont-; best-management-practices

NAL Call No.: TD420.A1P7

38. Economic and environmental impacts of water quality
protection policies. 2. Application to the Central High Plains.
Bernardo, D. J.; Mapp, H. P.; Sabbagh, G. J.; Geleta, S.;
Watkins, K. B.; Elliott, R. L.; Stone, J. F.

Water-resour-res v.29, p.3081-3091. (1993).

Includes references.

Descriptors: groundwater-pollution; groundwater-; water-quality;
water-policy; agricultural-chemicals; agricultural-production;
economic-impact; environmental-impact; mathematical-models;
programming-; simulation-models; models-; oklahoma-; kansas-;
texas-; new-mexico; colorado-; mathematical-programming-models;
transport-models

Abstract: A three-stage modeling framework is applied to evaluate
the potential economic and environmental impacts of agricultural
groundwater protection policies in the Central High Plains
Region. Three alternative policies (limitations on total nitrogen
applications, limitations on unit-area nitrogen applications, and
restrictions on the use of selected herbicides) are compared to a
baseline scenario that reflects the absence of any form of
groundwater quality protection measures. In general, nitrogen
restrictions are more effective in reducing nitrate loadings in
percolation water if implemented on a unit-area basis rather than
as a total (farm level) restriction. In contrast, the total
restriction is more effective in controlling runoff losses of
nitrogen. Both nitrogen restrictions have significant impacts on
crop production levels and regional agricultural income, while
the economic consequences of the pesticide restriction are much
less pronounced. The proposed regional modeling framework
provides critical information necessary to assess the economic
and environmental tradeoffs of policy alternatives aimed at
controlling agricultural nonpoint source pollution.

NAL Call No.: 292.8-W295

39. Economic and environmental impacts of water quality
protection policies. 1. Framework for regional analysis.
Bernardo, D. J.; Mapp, H. P.; Sabbagh, G. J.; Geleta, S.;
Watkins, K. B.; Elliott, R. L.; Stone, J. F.

Water-resour-res v.29, p.3069-3079. (1993).

Includes references.

Descriptors: groundwater-pollution; groundwater-; water-quality;
water-policy; agricultural-chemicals; agricultural-production;
economic-impact; environmental-impact; simulation-models;
mathematical-models; programming-; models-;
mathematical-programming-models; transport-models

Abstract: Agricultural production systems provide some unique
challenges for assessing the regional impacts of water quality
protection policies. A modeling framework is proposed for
assessing the environmental and economic consequences of
groundwater quality protection policies at the regional level.
The model consists of three components: (1) a crop

simulation/chemical transport model, (2) a regional economic optimization model, and (3) an aquifer groundwater flow model. The three submodels are linked and run recursively to simulate producer response to alternative water quality policies over a multiple-year time horizon. Model solutions provide projections of production practices employed on various resource situations across the region. Economic evaluation of alternative policies may be based upon regional agricultural income, crop production levels, input use, and changes in aquifer water levels over time. Measures of agricultural nonpoint source pollution provided by the model include nitrate, phosphorus and pesticide loadings in deep percolation and runoff water, as well as sediment losses.

NAL Call No.: 292.8-W295

40. Economics of water resources : from regulation to privatization.

Spulber, N.; Sabbaghi, A. 1.

Boston : Kluwer Academic Publishers, c1994. xxvi, 329 p. : ill..
Includes bibliographical references (p. 289-308) and index.

Descriptors: Water-resources-development;
Water-resources-development-Econometric-models;
Water-resources-development-Government-policy;
Water-quality-management

NAL Call No.: HD1691.S72--1994

41. Effect of depth of impervious layer and adsorption on solute transport in tile-drained irrigated lands.

Kamra, S. K.; Singh, S. R.; Rao, K. V. G. K.

J-hydrol v.155, p.251-264. (1994).

Includes references.

Descriptors: solutes-; salinity-; transport-processes;
tile-drainage; irrigated-conditions; adsorption-; saturated-flow;
unsaturated-flow; groundwater-; effluents-; soil-depth;
desalinization-; soil-depth; simulation-models; impervious-layer

Abstract: A two-dimensional finite element model of solute transport in a tile-drained soil-aquifer system was applied to study the effect of the depth of impervious layer and adsorption on salt distribution in the soil and groundwater, and the salinity of drainage effluent. The model considers steady state water flow in the unsaturated and saturated zones, and includes the effect of convective transport, dispersion and linear adsorption. The results indicate that though the depth of the impervious layer has little effect on salt distribution in the unsaturated zone, it significantly influences the quality of the drainage effluent. Further, it was found that during the initial years of reclamation of a highly saline soil with subsurface drainage, the effect of adsorption is more pronounced in the unsaturated zone than in the saturated zone and the movement of adsorbing solute species is retarded for a longer time in the groundwater than in the soil.

NAL Call No.: 292.8-J82

42. Effect of land surface representation on forest water and carbon budgets.

Band, L. E.

J-hydrol v.150, p.749-772. (1993).

In the special issue: Water Issues in Forests Today / edited by E.M. O'Loughlin and F.X. Dunin. November 22-26, 1992, Canberra, Australia.

Descriptors: forests-; watersheds-; simulation-models; evapotranspiration-; canopy-; photosynthesis-; soil-water-content; runoff-; landforms-; topography-; spatial-variation

Abstract: Forested landscapes often show very well-pronounced heterogeneity in the factors that control evapotranspiration, runoff production and carbon assimilation at a variety of length scales. In hilly or mountainous environments, strong contrasts in net radiation, available soil water, soil structure and stand characteristics can produce a large variance in both the meteorological drivers and surface resistance to carbon and water exchange with the atmosphere over distances measured in tens of metres. Because of the strong nonlinearities characterizing the influence of the environmental variables on surface resistance (particularly available soil water), the parametrization of surface process models with mean values of the environmental variables and no distribution often leads to significant bias in areal average carbon and water flux. However, it is often not feasible to incorporate directly the full distribution and patterns of the landscape for regional-scale models. Continental- and subcontinental-scale vegetation data sets currently being collected by synoptic-level satellites (e.g. the Advanced Very High Resolution Radiometer, AVHRR) do not capture the large proportion of landscape variability that exists below the resolution of the sensors. This paper explores the impacts of various landscape representation schemes that retain a range of detail in the description of land surface form and processes on simulated areal average evapotranspiration, runoff production and net carbon exchange with the atmosphere. Specific comparison is made of schemes that attempt to incorporate the topographic structure, soil and vegetation distributions of a region with schemes that sample the surface at levels similar to current coarse-resolution satellites. For strongly. variations in available soil water can have significant effects on areal averaged carbon and water flux rates, particularly under drying conditions, whereas the spatial variations in radiation, temperature and humidity over the terrain appear to have a lesser impact.

NAL Call No.: 292.8-J82

43. Effect of simulated climate change on snowmelt runoff modeling in selected basins.

Katwijk, V. F. v.; Rango, A.; Childress, A. E.

Water-resour-bull v.29, p.755-766. (1993).

Includes references.

Descriptors: meltwater-; runoff-; climatic-change; air-temperature; transpiration-; california-; colorado-

Abstract: The projected increase in the concentration of CO₂ and other greenhouse gases in the atmosphere is likely to result in a global temperature increase. This paper reports on the probable effects of a temperature increase and changes in transpiration

on basin discharge in two different mountainsnowmelt regions of the western United States. The hydrological effects of the climate changes are modeled with a relatively simple conceptual, semi-distributed snowmelt runoff model. Based on the model results, it may be concluded that increased air temperatures will result in a shift of snowmelt runoff to earlier in the snowmelt season. Furthermore, it is shown that it is very important to include the expected change in climate-related basin conditions resulting from the modeled temperature increase in the runoff simulation. The effect of adapting the model parameters streamflow to April and an even more significant decrease of snowmelt runoff in June and July. If the air temperatures increase by approximately 5 degrees C and precipitation and accumulated snow amounts remain about the same, runoff in April and May, averaged for the two basins, is expected to increase by 185 percent and 25 percent, respectively. The runoff in June and July will decrease by about 60 percent each month. Overall, the total seasonal runoff decreases by about 6 percent. If increased CO2 concentrations further change basin condition by reducing transpiration by the maximum amounts. temperature increase, the April, May, June, and July changes would average +230 percent, +40 percent, -55 percent, and -45 percent, respectively. The total seasonal runoff change would be +11 percent.

NAL Call No.: 292.9-Am34

44. Effects of motility and adsorption rate coefficient on transport of bacteria through saturated porous media.

Camper, A. K.; Hayes, J. T.; Sturman, P. J.; Jones, W. L.; Cunningham, A. B.

Appl-environ-microbiol v.59, p.3455-3462. (1993).

Includes references.

Descriptors: pseudomonas-aeruginosa; adsorption-; motility-; glass-; bioreactors-; transport-processes; pores-; porosity-; models-; soil-pore-system; strain-differences; glass-beads

Abstract: Three strains of *Pseudomonas fluorescens* with different motility rates and adsorption rate coefficients were injected into porous-medium reactors packed with 1-mm-diameter glass spheres. Cell breakthrough, time to peak concentration, tailing, and cell recovery were measured at three interstitial pore velocities (higher than, lower than, and much lower than the maximal bacterial motility rate). All experiments were done with distilled water to reduce the effects of growth and chemotaxis. Contrary to expectations, motility did not result in either early breakthrough or early time to peak concentration at flow velocities below the motility rate. Bacterial size exclusion effects were shown to affect breakthrough curve shape at the very low flow velocity, but no such effect was seen at the higher flow velocity. The tendency of bacteria to adsorb to porous-medium surfaces, as measured by adsorption rate coefficients, profoundly influenced transport characteristics. Cell recoveries were shown to be correlated with the ratio of advective to adsorptive transport in the reactors. Adsorption rate coefficients were found to be better predictors of microbial transport phenomena than individual characteristics, such as size, motility, or porous-medium hydrodynamics.

NAL Call No.: 448.3-Ap5

45. Environmental : hypermedia programs and water quality models.
Environmental hypermedia programs.
Center for Technology Transfer & Pollution Prevention.

West Lafayette, IN : Farm Building Plan Service, Purdue
University, [1994?] 1 computer laser optical disc 1 booklet.
Title from disc label.

Descriptors: Water-quality-Databases; Water-Pollution-Databases
NAL Call No.: TD370.E58--1994

46. Estimation of preferential movement of bromide tracer under
field conditions.
Jabro, J. D.; Lotse, E. G.; Fritton, D. D.; Baker, D. E.

J-hydrol v.156, p.61-71. (1994).
Includes references.

Descriptors: agricultural-chemicals; leaching-;
saturated-conditions; bromide-; tracers-; saturated-flow;
macropore-flow; infiltration-; soil-physical-properties;
saturated-hydraulic-conductivity; spatial-variation;
simulation-models; preferential-flow; leachm-simulation-model
Abstract: Leaching of agricultural chemicals from the root and
vadose zones into groundwater is an important environmental
concern. To procure a better understanding of the movement and
transport of agricultural chemicals through the soil profile, a
field research study was conducted to estimate bromide leaching
losses under saturated conditions where preferential flow is
occurring. The field data were then used to evaluate the LEACHM
model. Eighteen double-ring infiltrometers were used to apply a
pulse (100 mm depth) of bromide tracer on two previously
saturated soils located in a karst region of southeastern
Pennsylvania. Internal drainage over the next seven days resulted
in nearly 51% of the applied Br(-) being leached to a depth below
0.80 m. The LEACHM model was used to simulate the amount of
bromide leached in each infiltrometer. The model predicted,
accurately, an average of 46% of the applied Br(-) leached below
the 0.80 m depth. Mean values of bromide concentration in the
soil profile were predicted within two standard deviations of the
measured mean for all depths except for the 0.20-0.40 m depth
increment where the model overpredicted the bromide
concentration. The model predictions of Br(-) leached were tested
against field measurements using several statistical tests. The
LEACHM model performed adequately under preferential flow
conditions, perhaps because the infiltration rate at each site
was used as a model input. This, actually, is some measure of the
macropore flow process and suggests that simple models such as
LEACHM can be used in the field, as long as a distribution of
infiltration rates is used as an input.

NAL Call No.: 292.8-J82

47. Estimation of snowmelt runoff in the Peace River region using
a soil moisture budget.
Hayhoe, H. N.; Pelletier, R. G.; Van Vliet, L. J. P.

Can-j-soil-sci v.73, p.489-501. (1993).

Includes references.

Descriptors: meltwater-; runoff-; estimation-; prediction-;
equations-; algorithms-; mathematical-models; water-erosion;
losses-from-soil; water-budget; winter-; spring-; snow-; depth-;
frozen-conditions; freeze-thaw-cycles; british-columbia;
alberta-; frozen-soils

NAL Call No.: 56.8-C162

48. Evaluating agricultural nonpoint-source pollution using
integrated geographic information systems and hydrologic/water
quality model.

Tim, U. S.; Jolly, R.

J-environ-qual v.23, p.25-35. (1994).

Technical Reports from the Symposium, "Minimizing Agricultural
Nonpoint-Source Impacts", November 2, 1992, Minneapolis,
Minnesota.

Descriptors: water-pollution; agriculture-;
geographical-information-systems; simulation-models

Abstract: Considerable progress has been made in developing
physically based, distributed parameter, hydrologic/water quality
(H/WQ) models for planning and control of nonpoint-source
pollution. The widespread use of these models is often
constrained by the excessive and time-consuming input data
demands and the lack of computing efficiencies necessary for
iterative simulation of alternative management strategies. Recent
developments in geographic information systems (GIS) provide
techniques for handling large amounts of spatial data for
modeling nonpoint-source pollution problems. Because a GIS can be
used to combine information from several sources to form an array
of model input data and to examine any combinations of spatial
input/output data, it represents a highly effective tool for H/WQ
modeling. This paper describes the integration of a
distributed-parameter model (AGNPS) with a GIS (ARC/INFO) to
examine nonpoint sources of pollution in an agricultural
watershed. The ARC/INFO GIS provided the tools to generate and
spatially organize the disparate data to support modeling, while
the AGNPS model was used to predict several water quality
variables including soil erosion and sedimentation within a
watershed. The integrated system was used to evaluate the
effectiveness of several alternative management strategies in
reducing sediment pollution in a 417-ha watershed located in
southern Iowa. The implementation of vegetative filter strips
and contour buffer (grass) strips resulted in a 41 and 47%
reduction in sediment yield at the watershed outlet,
respectively. In addition, when the integrated system was used,
the combination of the above management strategies demonstrated
the utility of integrating a simulation model with GIS for
nonpoint-source pollution control and planning. Such techniques
can help characterize the diffuse sources of pollution at the
landscape level.

NAL Call No.: QH540.J6

49. Evaluating and predicting the spatial and temporal
variability of storm runoff generation in watersheds of arid and
semi-arid regions.

Morin, J.; United States Israel Binational Agricultural Research

and Development Fund.

Bet Dagan, Israel : BARD, 1993. 306 p. : ill. (some col.), maps.
Final report.

Descriptors: Rain-and-rainfall-Mathematical-models;
Runoff-Mathematical-models

NAL Call No.: QC925.E93--1993

50. Evaluating the chemical movement in layered soil model as a
tool for assessing risk of pesticide leaching to groundwater.
Nofziger, D. L.; Chen, J. S.; Haan, C. T.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1133-1155.
(1994).

Special Issue on the Evaluation and Comparison of Pesticide
Leaching.

Descriptors: pesticides-; leaching-; simulation-models;
soil-properties; groundwater-pollution; risk-; cmls-model

NAL Call No.: TD172.J6

51. Evaluation and comparison of pesticide leaching models for
registration purposes. Results of simulations performed with the
pesticide leaching model.

Klein, M.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1197-1209.
(1994).

Special Issue on the Evaluation and Comparison of Pesticide
Leaching.

Descriptors: bentazone-; dichlorprop-; leaching-;
simulation-models; registration-; macropores-; prediction-;
pesticide-registration

NAL Call No.: TD172.J6

52. Evaluation and comparison of pesticide leaching models for
registration purposes.

Bergstrom, L. F.; Jarvis, N. J.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1061-1072.
(1994).

Special Issue on the Evaluation and Comparison of Pesticide
Leaching.

Descriptors: pesticides-; leaching-; simulation-models;
registration-

NAL Call No.: TD172.J6

53. Evaluation of GLEAMS and PRZM for predicting pesticide
leaching under field conditions.

Zacharias, S.; Heatwole, C. D.

Trans-ASAE v.37, p.439-451. (1994).

Includes references.

Descriptors: zea-mays; no-tillage-; pesticides-; leaching-;
simulation-models; virginia-; groundwater-loading;
effects-of-agricultural-management-systems;
pesticide-rootzone-model; nonpoint-source-pollution

Abstract: Pesticide simulation models, GLEAMS and PRZM, were

evaluated for their ability to predict pesticide behavior using field data from a plot under no-till corn in the Coastal Plain region of Virginia. The models were evaluated in an uncalibrated mode as well as with adjustment of important hydrology parameters. The evaluation of model performance was based on graphical displays and statistical measures. Difference in evapotranspiration (ET) predictions by the two models caused the simulated results from their hydrology components to vary. Runoff and soil moisture measured in the field were predicted reasonably well after adjusting important hydrology parameters. Except for differences in magnitude, both models predicted the chemical concentration profiles similarly. Overall, GLEAMS represented pesticide behavior in soil better than PRZM. The models, GLEAMS and PRZM, performed well in predicting pesticide mass in the root zone, but were less reliable in predicting pesticide concentration distributions in soil. Model predictions of pesticide fate and transport were not greatly affected by changes in curve number and the water holding capacity of the soil.

NAL Call No.: 290.9-Am32T

54. Evaluation of methods for determining soil-water retentivity and unsaturated hydraulic conductivity.

Marion, J. M.; Or, D.; Rolston, D. E.; Kavvas, M. I.; Biggar, J. W.

Soil-sci v.158, p.1-13. (1994).

Includes references.

Descriptors: soil-water-retention;
unsaturated-hydraulic-conductivity; determination-;
soil-analysis; analytical-methods; evaluation-;
soil-water-content; matric-potential; transport-processes;
mathematical-models

NAL Call No.: 56.8-So3

55. Evaluation of runoff and erosion models.

Wu, T. H.; Hall, J. A.; Bonta, J. V.

J-irrig-drain-eng v.119, p.364-382. (1993).

Includes references.

Descriptors: erosion-; runoff-; sediment-yield; measurement-;
simulation-models;
agricultural-non-point-source-pollution-model-agnpms;
areal-non-point-source-watershed-environmental-response-simulation-model-
answers; chemicals-runoff-and-erosion-from-agricultural-management-
systems-model-creams

NAL Call No.: 290.9-AM3Ps-IR

56. Evaluation of the GLEAMS model for pesticide leaching in Sweden.

Shirmohammadi, A.; Knisel, W. G.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1167-1182. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: dichlorprop-; bentazone-; leaching-; drainage-;
simulation-models;

groundwater-loading-effects-of-agricultural-management-systems

NAL Call No.: TD172.J6

57. Experimental approach and simulation of the retention processes limiting orthophosphate transport in groundwater. Isenbeck Schroter, M.; Doring, U.; Moller, A.; Schroter, J.; Matthes, G.

J-contam-hydrol v.14, p.143-161. (1993).

Includes references.

Descriptors: groundwater-pollution; orthophosphates-; simulation-models; sorption-; retention-

NAL Call No.: TD426.J68

58. An expert systems approach for assessing the potential for pesticide contamination of ground water. Crowe, A. S.; Mutch, J. P.

Ground-water. Dublin, Ohio : Ground Water Pub. Co. May/June 1994. v. 32 (3) p. 487-498.

Includes references.

Descriptors: pesticides-; groundwater-pollution; expert-systems; assessment-; models-

NAL Call No.: TD403.G7

59. An exploration of the economics of farm management alternatives to improve water quality. Heilman, P.; Yakowitz, D. S.; Stone, J. J.; Kramer, L. A.; Lane, L. J.; Imam, B.

Application of advanced information technologies effective management of natural resources proceedings of the 18-19 June 1993 Conference, Spokane, Washington /. St. Joseph, Mich. : American Society of Agricultural Engineers, c1993.. p. 194-205.

Includes references.

Descriptors: water-quality; pollutants-; farm-management; farm-income; decision-making; simulation-models; usda-; iowa-; prototype-decision-support-system; agricultural-research-service

NAL Call No.: GE5.A66-1993

60. Farm-level evaluation of alternative policy approaches to reduce nitrate leaching from midwest agriculture. Swinton, S. M.; Clark, D. S.

Agric-resour-econ-rev v.23, p.66-74. (1994).

Includes references.

Descriptors: farming-; nitrate-nitrogen; leaching-; pollution-control; economic-policy; economic-analysis; federal-programs; models-

NAL Call No.: HD1773.A2N6

61. Fate of aldicarb in the vadose zone beneath a cotton field. Cai, D.; Xiang, F.; Jiang, X.; Zhu, Z.; Hua, X.; Dai, Z.

J-contam-hydrol v.14, p.129-142. (1993).

Includes references.

Descriptors: soil-pollution; aldicarb-; pesticide-residues;

movement-in-soil; groundwater-pollution; cotton-; fields-;
simulation-models; jiangsu-
NAL Call No.: TD426.J68

62. A finite element model for simulating runoff and soil erosion from mechanically treated agricultural lands. 2. Field validation and applications.

Sharda, V. N.; Singh, S. R.; Sastry, G.; Dhruvanarayana, V. V.

Water-resour-res v.30, p.2299-2310. (1994).

Includes references.

Descriptors: agricultural-land; erosion-; runoff-;
soil-conservation; precipitation-; simulation-models

Abstract: The finite element model for simulation of runoff and erosion as developed by Sharda and Singh (this issue) is evaluated using data collected from agricultural land treated with major mechanical soil and water conservation measures, namely, contour bunding, graded bunding, bench terracing, and conservation bench terracing. The simulated and experimentally realized hydrographs and soil loss values are in reasonably good agreement for various measures. Probable reasons for discrepancies between the predicted and observed values are discussed. The model has the potential of being used on a single storm or a continuous basis provided the soil, crop, and climatic parameters are precisely known or estimated for a given location and for the period under consideration. The model logically simulates the effects of flow, topographic, soil, and crop parameters such as antecedent moisture level, roughness coefficient, saturated hydraulic conductivity, slope, depth of impoundment, size of outlet, longitudinal slope of the channel, vertical interval, and cropping management factor. The model is found to be quite sensitive to changes in roughness coefficient, rainfall excess rate, and cover management factor, and hence these parameters need to be assessed carefully in the field. The general applicability of the model as a planning tool for soil conservation measures and the scope for future development are also discussed.

NAL Call No.: 292.8-W295

63. A finite element model for simulating runoff and soil erosion from mechanically treated agricultural lands. 1. Governing equations and solutions.

Sharda, V. N.; Singh, S. R.

Water-resour-res v.30, p.2287-2298. (1994).

Includes references.

Descriptors: agricultural-land; erosion-; runoff-; infiltration-;
soil-water-balance; geological-sedimentation; precipitation-;
soil-conservation; simulation-models; equations-

Abstract: A finite element model simulating runoff and soil erosion from agricultural lands is developed. The computational efficiency and stability of various numerical schemes used for time integration are critically examined employing L2 and Chebycheff (Chebyshev) norms. Predictor-corrector and fully implicit schemes are found to give the least values of norms, thereby permitting larger time steps. A finite element solution of the one-dimensional Richards equation with a sink term

simulates rain infiltration and soil moisture balance in cropped fields. A criterion to ensure stability and convergence of the solution is suggested. A finite element solution of the sediment continuity equation in conjunction with a fully implicit scheme for time integration and Yalin's equation for sediment transport capacity is developed to simulate soil erosion. The potential of the model to reasonably simulate runoff and soil erosion is demonstrated by comparing the finite element solutions with the analytical solutions under simplified configurations and with experimental data.

NAL Call No.: 292.8-W295

64. Flux-averaged concentrations for transport in soils having nonuniform initial solute distributions.

Toride, N.; Leij, F. J.; Van Genuchten, M. T.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Nov/Dec 1993. v. 57 (6) p. 1406-1409.

Includes references.

Descriptors: soil-physics; solutes-; transport-processes; movement-in-soil; mathematical-models

Abstract: The need to distinguish between volume-averaged or resident concentrations $[c(r)]$ and flux-averaged or flowing concentrations $[c(r)]$ is now widely accepted. Flux-averaged concentrations associated with the convection-dispersion equation (CDE) have been mostly used for solute transport problems involving uniform initial distributions. We present flux-averaged concentrations for nonuniform initial distributions using analytical solution methods for a semi-infinite soil system and numerical methods for a finite system. Mathematically, $c(r)$ is equivalent to $c(r)$ associated with a first-type inlet condition (rather than a third-type condition) only for semi-infinite soil profiles having uniform initial conditions. We show that, for a stepwise initial distribution, c , can be both negative or much greater than the initial concentration of $c(r)$, especially during the early stages of solute displacement. This physically odd situation results from the fact that $c(r)$ represents a solute flux rather than a directly measurable volumetric concentration.

Flux-averaged concentrations at the exit of a finite soil column with a uniform initial distribution are nearly identical to $c(r)$ for a semi-infinite system when the column Peclet number is greater than approximately 5. However, if the initial distribution involves a high gradient in $c(r)$ near the exit, $c(r)$ values for finite and semi-infinite systems at the exit can be very different, similarly as those for $c(r)$ because of the adoption of different outlet.

NAL Call No.: 56.9-So3

65. Gaining forests but losing ground: a GIS evaluation in a Himalayan watershed.

Schreier, H.; Brown, S.; Schmidt, M.; Shah, P.; Shrestha, B.; Nakarmi, G.; Subba, K.; Wymann, S.

Environ-manage. New York, Springer-Verlag. Jan/Feb 1994. v. 18 (1) p. 139-150.

includes references.

Descriptors: watersheds-; deforestation-;
geographical-information-systems; evaluation-; mountain-areas;
nepal-

NAL Call No.: HC79.E5E5

66. General stochastic unit hydrograph.

Hjelmfelt, A.; Wang, M.

J-irrig-drain-eng v.120, p.138-148. (1994).

Includes references.

Descriptors: watersheds-; runoff-water; rain-; stochastic-models;
missouri-

NAL Call No.: 290.9-AM3Ps-IR

67. GIS application to water quality management in the upper
Volga River

Belyaeva, T.; Higgins, J. M.; Kirpichnikova, N.; Lanzova, I.;
Hagerman, J. R.

Water-sci-technol v.28, p.119-127. (1993).

Paper presented at the IAWQ First International Conference on
"Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact,
Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: water-resources; water-management;
geographical-information-systems; russia-; usa-;
tennessee-valley-authority

NAL Call No.: TD420.A1P7

68. GOSSYM/COMAX: a cotton crop management emphasizing irrigation
scheduling and water quality.

McKinion, J. M.; Boone, M. Y. L.; Porter, D. O.; Whisler, F. D.

Proceedings of Industrial and Agricultural Impacts on the
Hydrologic Environment the Second USA/CIS Joint Conference on
Environmental Hydrology and Hydrogeology / USA/CIS Joint
Conference on Environmental Hydrology and Hydrogeology.

Alexandria, VA : Water Environment Federation, c1993.. v. 2 p.
23-36.

Title on cover : Environmental impact of agricultural practices
and agrichemicals / edited by Y. Eckstein and A. Zaporozec.

Descriptors: gossypium-; irrigated-farming;
irrigation-scheduling; simulation-models; water-quality;
mississippi-

NAL Call No.: GB652.U82-1993

69. Groundwater contamination from agricultural sources in
Northern Italy: long-term monitoring and mathematical modelling.

Fortina, L.; Capodaglio, A. G.; Baldi, M.

Water-sci-technol v.28, p.369-377. (1993).

Paper presented at the IAWQ First International Conference on
"Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact,
Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: groundwater-pollution; herbicides-;
mathematical-models; italy-

NAL Call No.: TD420.A1P7

70. Groundwater quality.

Mayer, A. S.; Imhoff, P. T.; Mitchell, R. J.; Rabideau, A. J.;
McBride, J. F.; Miller, C. T.

Water-environ-res v.66, p.532-585. (1994).

Includes references.

Descriptors: groundwater-pollution; pollutants-;
transport-processes; water-quality; monitoring-; biodegradation-;
movement-in-soil; groundwater-flow; sorption-; desorption-;
pesticides-; leaching-; models-; literature-reviews

NAL Call No.: TD419.R47

71. Groundwater quality management of a low inertia basin:
application to the San Mateo Basin, California.

Bagtzoglou, A. C.; Khan, M. N.; Guymon, G. L.

Water-resour-manag v.7, p.189-205. (1993).

Includes references.

Descriptors: groundwater-; water-quality; water-management;
watersheds-; groundwater-recharge; water-yield;
finite-element-analysis; models-; water-storage; california-;
nodal-domain-integration

Abstract: A two-dimensional finite element model is applied to the San Mateo Basin, California in order to investigate feasible and efficient management alternatives to enhance the basin yield and preserve the basin water quality. The model utilizes lumped approximation methods for the determination of its subsurface boundary conditions, and incorporates a variety of hydrological processes. The model solves uncoupled flow and transport equations using a nodal domain integration technique for the flow model and an integrated finite difference method for the transport model. The model incorporates the basin inputs and outputs as ocean flux, well and phreatophyte extractions, subsurface inflow, precipitation and streambed percolation. Modeling results indicate that the sustained yield may be maximized by interception of ocean outflow from the basin. An improvement of about four times of the historical sustained yield was achieved. This strategy required relocation of existing wastewater recharge ponds and increasing basin extractions. In order to intercept most of the ocean outflow by increasing basin extractions, simulated subsurface seawater intrusion was observed. The water quality study indicated that the basin yield could be increased significantly by moderately relaxing the water quality criteria near the ocean.

NAL Call No.: TC401.W27

72. Growing corn root effects on interrill soil erosion.

Bui, E. N.; Box, J. E. Jr.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. July/Aug 1993. v. 57 (4) p. 1066-1070.

Includes references.

Descriptors: zea-mays; roots-; length-; density-;
soil-stabilization; interrill-erosion; erosion-control;
crop-growth-stage; runoff-; sediment-; losses-from-soil;
erodibility-; mathematical-models; georgia-;
water-erosion-prediction-project-model

Abstract: The relationship between plant roots and interrill soil erosion is important in dynamic soil erosion predictions. Rainstorm simulations of similar intensity (63.5 mm h⁻¹) were conducted in the summer of 1989 on 1 by 1 m field plots of Cecil sandy loam (clayey, kaolinitic, thermic Typic Kanhapludult) to study the effect of different root length densities, L(v) (cm cm⁻³), of corn (Zea mays L.), during vegetative, preanthesis, and anthesis plant developmental stages on interrill soil erosion. Sediment loss and runoff data were assigned to treatments, L(va), on the basis of L(v) range to reduce rooting variability associated with plant developmental stage. To avoid confounding by canopy cover, corn plants were cut at the stem base and removed for the first four sets of simulations. A reference set of simulations was performed on a fallow plot containing no roots, L(va). Runoff and detached sediment were collected in buckets from each plot during successive 5-min intervals over a 1-h period. Thirty cores, 5 cm in diam. and 5 cm deep, were taken from each 1-m² plot and roots were washed from the cores and measured. Means for runoff and detached sediment were generally not significantly different for the high L(v) or L(va), and L(va0). When L(va) was < 1.5 cm cm⁻³, runoff and detached sediment were significantly lower during the first 30 min of simulated rainfall. High densities of live corn roots did not reduce interrill soil erosion from a moldboard-plowed Cecil sandy loam.

NAL Call No.: 56.9-So3

73. A hedonic analysis of herbicides: do user safety and water quality matter.

Beach, E. D.; Carlson, G. A.

Am-j-agric-econ. Ames, Iowa : American Agricultural Economics Association. Aug 1993. v. 75(3) p. 612-623.

Includes references.

Descriptors: herbicides-; weed-control; water-quality; safety-; farmers'-attitudes; econometric-models; zea-mays; glycine-max; decision-analysis; usa-; arkansas-; iowa-; north-carolina; ohio-; broadleaf-weeds

Abstract: Farmers may value water quality and user safety characteristics of herbicides as they select among products to obtain weed control. Expenditures per application in the U.S. corn and soybean herbicide markets are explained by several safety characteristics in addition to market and weed control characteristics. The explicit inclusion of safety characteristics in the farm decision model indicates that not all safety aspects of pesticide use are external to farmers. Leaching potential and user toxicity are statistically significant, but their elasticities are small relative to broadleaf and grass weed control efficacy.

NAL Call No.: 280.8-J822

74. Human intestinal cell line Caco-2: a useful model for studying cellular and molecular regulation of biotin uptake.

Ma, T. Y.; Dyer, D. L.; Said, H. M.

Biochim-biophys-acta v.1189, p.81-88. (1994).

Includes references.

Descriptors: biotin-; nutrient-uptake; regulation-;
transport-processes; intestines-; cell-lines

Abstract: The mechanisms of enterocyte and molecular regulation of biotin uptake are poorly understood. An intestinal cell line possessing the transport characteristics of native intestinal cells is highly desirable to investigate the finer details of the cellular processing and molecular regulation of biotin transport. In the present study, we investigated the uptake of the water-soluble vitamin biotin by a human intestinal cell line Caco-2. Uptake of both low (4 nM) and high (20 micromolar) concentrations of biotin by confluent monolayers of Caco-2 cells was appreciable and linear for up to 10 min of incubation. Replacement of Na⁺ in the incubation medium with other monovalent cations -- K⁺, choline, Li⁺ and NH₄⁺ -- caused a significant inhibition of biotin uptake; a relatively lesser inhibition was seen with Li⁺. Initial rate of uptake of biotin was temperature-dependent and saturable as a function of concentration at 37 degrees C but not at 4 degrees C. The V_{max} and apparent K_m of the temperature-dependent saturable process were 520 pmol/mg protein per min and 9.5 micromolars, respectively. The addition of unlabeled biotin and the structural analogue desthiobiotin to the incubation media caused a significant inhibition of the uptake of [3H]biotin. The inhibitory effect of desthiobiotin was competitive in nature with an inhibition constant (K_i) of 41 micromolar. Biocytin, on the other hand, was a weak inhibitor and biotin methyl ester and diaminiobiotin did not have any effect. Pretreatment of Caco-2 cells with the monovalent cation ionophore gramicidin and the Na⁺, K⁺-ATPase inhibitor ouabain caused significant inhibition of biotin uptake. Pretreatment with the K⁺ ionophore valinomycin did not affect biotin. Biotin- to Na⁺ coupling was found to be 1:1. Growing confluent Caco-2 cells in a biotin-deficient environment resulted in rapid up-regulation of biotin transport with a marked increase (258%) in the V_{max} of biotin uptake. These findings demonstrate that biotin uptake by Caco-2 cells is via a carrier-mediated system. This system is temperature-dependent, driven by Na⁺-gradient and is regulated by the substrate level. These in-vitro findings are very similar to and further confirm previous findings in human and animal studies and dispute other findings previously reported for Caco-2 cells; the present study also demonstrates the suitability of this system for further characterization of the cellular and molecular regulation of biotin uptake.

NAL Call No.: 381-B522

75. Hystem-EXTRAN: improvements to EPA-EXTRAN.

Fuchs, L.; Scheffer, C.

Water-sci-technol v.29, p.63-71. (1994).

Selected Proceedings of the 6th International Conference on Urban Storm Drainage, September 12-17, 1993, Niagara Falls, Canada / edited by J.C. Marsalek and H.C. Torno.

Descriptors: rain-; runoff-; hydrology-; water-management;
simulation-models

NAL Call No.: TD420.A1P7

76. Identification of road salt contamination using multiple

regression and GIS.
Mattson, M. D.; Godfrey, P. J.

Environ-manage. New York, Springer-Verlag. Sept/Oct 1994. v. 18
(5) p. 767-773.

Includes references.

Descriptors: streams-; salt-; sodium-chloride; water-pollution;
regression-analysis; geographical-information-systems;
massachusetts-

NAL Call No.: HC79.E5E5

77. The impact of changes in the runoff formulation of a general
circulation model on surface and near-surface parameters.

Viterbo, P.; Illari, L.

J-hydrol v.155, p.325-336. (1994).

Special Issue: Mesoscale Hydrology and General Circulation
Models.

Descriptors: soil-water; runoff-; simulation-models;
precipitation-; infiltration-; evapotranspiration-;
air-temperature; geographical-distribution; forecasting-

Abstract: The surface and near-surface properties of the European
Centre for Medium Range Weather Forecasting (ECMWF) general
circulation model are shown to be sensitive to the
parametrization of runoff. If a border subgrid-scale
distribution of precipitation is assumed when computing runoff,
the infiltration increases, more water becomes available for
evaporation and the model surface cools. The averaged Bowen
ratio over land is shown to decrease from 1.5 to 0.9 in a
Northern Hemisphere summer experiment. Possible implications for
the estimation of soil moisture and evapotranspiration using a
global data assimilation-forecasting system are discussed.

NAL Call No.: 292.8-J82

78. Impact of coal combustion waste on the microbiology of a
model aquifer.

Brunning, J. S.; Caldwell, D. E.; Lawrence, J. R.; Robarts, R. D.

Water-air-soil-pollut v.74, p.103-120. (1994).

Includes references.

Descriptors: aquifers-; groundwater-; pollution-;
fluidized-bed-wastes; coal-; combustion-; infiltration-;
leaching-; landfills-; landfill-leachates; groundwater-;
water-quality; alkalinity-; heterotrophic-microorganisms;
bacteria-; bacterial-count

NAL Call No.: TD172.W36

79. The impact of recession infiltration on runoff volume
computed by the kinematic wave model.

Stone, J. J.; Shirley, E. D.; Lane, L. J.

Trans-ASAE v.36, p.1353-1361. (1993).

Includes references.

Descriptors: runoff-water; infiltration-; rain-; kinematics-;
models-

Abstract: The effect of recession infiltration on runoff volume
is quantified using the kinematic wave model for the case of

lateral inflow made up of constant rainfall excess during the period of rainfall and constant infiltration after rainfall ends. A general solution is obtained using the following non-dimensional quantities; $Q^* = Q/R(e)$ (runoff volume divided by rainfall excess volume), $t^* = t(e)/D$ (time to kinematic equilibrium divided by the duration of rainfall excess), and $f^* = f/r(e)$ (infiltration rate divided by rainfall excess rate). Using these quantities, the relationship for the reduction of runoff volume is $Q^* = 1 - m/(m+1) t^* [f^*/(f^*+1)]^{1/m}$ when $t^* < [(f^*+1)/f^*]^{1/m}$ and $Q^* = 1/(m+1) t^{*1(-m)} (f^*+1)/f^*$ when $t^* > [(f^*+1)/f^*]^{1/m}$ where m is the kinematic wave depth-discharge exponent. The first equation corresponds to the case when flow ceases after the characteristic from distance and time zero, $C(0,0)$, reaches the end of the plane. The second equation corresponds to the case when the flow ceases and $C(0,0)$ does not reach the end of the plane. These equations approximate the reduction of runoff volume for the more general case of time varying rainfall excess under constant and variable rainfall as would be the case when the rainfall excess is generated using the Green-Ampt infiltration equation.

NAL Call No.: 290.9-Am32T

80. Importance of soil and cropping systems in the development of regional water quality policies.

Geleta, S.; Sabbagh, G. J.; Stone, J. F.; Elliott, R. L.; Mapp, H. P.; Bernardo, D. J.; Watkins, K. B.

J-environ-qual v.23, p.36-42. (1994).

Technical Reports from the Symposium, "Minimizing Agricultural Nonpoint-Source Impacts", November 2, 1992, Minneapolis, Minnesota.

Descriptors: triticum-aestivum; sorghum-bicolor; zea-mays; cropping-systems; soil-types; crop-yield; nitrate-nitrogen; leaching-; water-quality; irrigation-; simulation-models; geographical-information-systems; oklahoma-

Abstract: Targeting certain soils and cropping systems may be necessary in consideration of regional water quality protection policies. However, little information is available relating soils and cropping practices to regional water quality problems. This study evaluates crop yield and NO₃-N movement to surface and groundwater on four soils and nine principal cropping systems in the High Plains region of Oklahoma. The cropping systems involve wheat (*Triticum aestivum* L.), grain sorghum [*Sorghum bicolor* (L.) Moench], and corn (*Zea mays* L.), and are part of a regional data base also containing soils and chemical management information. For each combination of crop, soil, cropping system, and chemical alternative, a 20-yr simulation was made. The simulation was based on a modeling system that includes EPIC-PST (crop growth/chemical movement model) interfaced with a Geographic Information System (GIS), Earthone. Results of each simulation included crop yield and NO₃-N movement in runoff and percolation. Results show wide variations in NO₃-N losses for different soils, irrigation systems, and cropping systems. When compared with continuous irrigated wheat and grain sorghum cropping systems, double-cropped wheat-grain sorghum resulted in greater NO₃-N loss in percolation. Compared with sprinkler and LEPA (low energy precision application) irrigation systems, furrow irrigation

resulted in high NO₃-N loss on both fine-textured and coarse-textured soils, with significantly greater loss on the coarser-textured soils. The modeling framework can be used to compare alternative water quality policies. Broad policies such as a restriction on the amount of N that can be applied per hectare can be compared with targeted. coarser soils or under furrow irrigation.

NAL Call No.: QH540.J6

81. Infiltration and redistribution of organic liquids in layered porous media.

Cary, J. W.; Simmons, C. S.; McBride, J. F.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1994. v. 58 (3) p. 704-711.

Includes references.

Descriptors: porous-media; oils-; transport-processes;

infiltration-; redistribution-; mathematical-models; vadose-zone

Abstract: The remediation of many toxic waste sites throughout the world requires a better understanding of the flow of organic liquids in the vadose zone. The infiltration and redistribution of three water-immiscible oils into columns filled with porous material containing different textural layers are reported. In some experiments, oil followed water into the columns and in others, water followed oil. An explicit, one-dimensional, multiphase flow code was used to model the results. The numerical model contains elements of code that: (i) mimic the Haines jump phenomenon in dry sand, (ii) account for oil entrapment when water infiltrates, (iii) include forces on the oil phase caused by surface-spreading pressures at the oil front in water-wetted pores, (iv) include forces on the oil phase caused by water intrusion into hydrophilic oil-saturated pores, and (v) generate a factor that matches the water potentials of textural layers for the initial boundary conditions. In general, the model did a reasonable job of predicting the distribution of both water and oil 8 h after infiltration was started, though some unresolved problems persist. The liquid potential matching factor and the hydrophobicity of the mineral particles induced by a transmission oil have practical applications. The matching factor may be easily adapted to all codes that model flow through layers. The in situ creation of hydrophobic mineral particles may prove useful for containing immiscible organic liquids that leak into the vadose zone.

NAL Call No.: 56.9-So3

82. Influence of amount and method of irrigation water application on leaching of atrazine.

Troiano, J.; Garretson, C.; Krauter, C.; Brownell, J.; Huston, J.

J-environ-qual v.22, p.290-298. (1993).

Includes references.

Descriptors: atrazine-; leaching-; percolation-; irrigation-;

soil-water-content; spatial-distribution; sandy-soils;

simulation-models; california-; leachm-model

Abstract: A study was conducted to relate leaching of an herbicide, atrazine

[6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4,-di

amine], and inorganic water tracers, Br⁻ and Cl⁻, to the amount of deep-percolating water produced from irrigation. Soil at the site was classified as a Dehli Loamy Sand (Mixed, Thermic, Typic Xeropsamment) which was an unstructured sandy soil that was low in organic C content, conditions conducive to solute leaching. The relationship between depth of solute movement and amount of deep-percolating water was measured in sprinkler, basin, and furrow irrigation methods. Soil distribution of inorganic tracers indicated that graded levels of added water treatments, which were based on reference evapotranspiration, produced corresponding increases in the depth of percolated water. Atrazine's soil distribution indicated greater downward movement in response to increases in amount of deep-percolating water. Magnitude of leaching differed between irrigation methods and increased in the order: sprinkler < basin < furrow. Simulations using the LEACHM model provided a physically based explanation for the differences in water movement between sprinkler and basin methods. The total amount of applied water was similar at each level of percolation but sprinkler irrigations were more frequent, resulting in more evaporation and, consequently, less water available for deep percolation. Both amount and method of water application are important factors that determine pesticide movement and that, in irrigated agriculture, must be considered as integral components of pesticide management.

NAL Call No.: QH540.J6

83. The influence of variable precipitation patterns on simulations of pesticide mobility.

Roth, G.; Stahl, G.; Iwan, J.

Pestic-sci v.38, p.341-346. (1993).

Includes references.

Descriptors: pesticides-; leaching-; precipitation-; variation-; temperature-; frequency-distribution; weather-data; monte-carlo-method; simulation-models

Abstract: The behaviour of pesticides in the soil is governed by a variety of complex processes including the climatic conditions. To investigate the influence of these specific factors, a Monte-Carlo Method was used to generate sequences of daily precipitation and temperature data representing natural weather behaviour. Simulations of the leaching process were performed for different compounds with these sequences while all other environmental parameters were held constant. The results indicated that the use of stochastic variables yields new insight into the leaching process. It is shown that the naturally occurring variability of the weather pattern has a crucial influence on the leaching of pesticides.

NAL Call No.: SB951.P47

84. Integrated flux model for unsteady transport of trace organic chemicals in soils.

Moldrup, P.; Poulsen, T. G.; Rolston, D. E.; Yamaguchi, T.; Hansen, J. A.

Soil-sci v.157, p.137-152. (1994).

Includes references.

Descriptors: organic-compounds; transport-processes;

movement-in-soil; drained-conditions; deterministic-models;
unsaturated-soils; vadose-zone;
relative-impact-of-chemicals-at-transient-state-riocats
NAL Call No.: 56.8-So3

85. Integrating water quality modeling with ecological risk assessment for nonpoint source pollution control: a conceptual framework.

Chen, Y. D.; McCutcheon, S. C.; Rasmussen, T. C.; Nutter, W. L.; Carsel, R. F.

Water-sci-technol v.28, p.431-440. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: water-quality; protection-; pollution-control; ecology-; risk-; assessment-; models-; usa-; best-management-practices

NAL Call No.: TD420.A1P7

86. Integration of geographic information systems and a computer model to evaluate impacts of agricultural runoff on water quality.

He, C.; Riggs, J. F.; Kang, Y. T.

Water-resour-bull v.29, p.891-900. (1993).

Includes references.

Descriptors: runoff-; river-water; water-pollution; water-quality; nitrogen-; phosphorus-; simulation-models; geographical-information-systems; michigan-; geographic-resource-analysis-support-system-grass; grass-waterworks;

agricultural-nonpoint-source-pollution-model-agnps; cass-river; saginaw-bay; best-management-practices

Abstract: This study integrates an Agricultural Non-Point Source Pollution Model (AGNPS), the Geographic Resource Analysis Support System (GRASS) (U.S. Army Corps of Engineers, 1987), and GRASS WATERWORKS (a hydrologic modeling tool box being developed at the Michigan State University Center for Remote Sensing) to evaluate the impact of agricultural runoff on water quality in the Cass River, a subwatershed of Saginaw Bay. AGNPS is used to estimate the amounts, origin, and distribution of sediment, nitrogen (N), and phosphorus (P) in the watershed. GRASS and GRASS WATERWORKS are used to generate parameters needed for AGNPS from digital maps, which include soil association, land use, watershed boundaries, water features, and digital elevation. Outputs of the model include spatially distributed estimates of volume and peak runoff, overland and channel erosion, sediment yields, and concentrations of nitrogen and phosphorus. Management scenarios are explored in the AGNPS model to minimize sedimentation and nutrient loading. Scenarios evaluated include variations in crop cover, tillage methods, and other agricultural management practices. In addition, areas vulnerable to erosion are identified for best management practices.

NAL Call No.: 292.9-Am34

87. Interfacial tension-induced transport of nonaqueous phase

liquids in model aquifer systems.
Anderson, M. A.

Water-air-soil-pollut v.75, p.51-60. (1994).

Includes references.

Descriptors: soil-pollution; groundwater-; pollution-; solvents-;
fuels-; transport-processes; immiscible-displacement;
surface-tension; toluene-; sand-

NAL Call No.: TD172.W36

88. Investigating prediction capability of HEC-1 and KINEROS
kinematic wave runoff models.

Obiukwu Duru, J.; Hjelmfelt, A. T. Jr.

J-hydrol v.157, p.87-103. (1994).

Includes references.

Descriptors: watersheds-; rain-; storms-; runoff-;
catchment-hydrology; prediction-; simulation-models

Abstract: In this study, two distributed parameter, physically based, kinematic wave hydrologic models, HEC-1 and KINEROS, were tested on a 30.4 ha watershed located near Treynor, Iowa. The study had two objectives: (1) to determine the ability of the models to predict runoff with very limited calibration: (2) to determine how accurately the models can simulate runoff given accurate model parameters. The results show that HEC-1 can achieve good prediction of runoff with very limited calibration. It was not, however, possible to achieve the same level of prediction with the KINEROS model. Given good calibration, both models can simulate the rainfall runoff process with great accuracy.

NAL Call No.: 292.8-J82

89. Lake water quality modeling for projected future climate scenarios.

Stefan, H. G.; Hondzo, M.; Fang, X.

J-environ-qual v.22, p.417-431. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research Center Symposium XVII, "Agricultural Water Quality Priorities, A Team Approach to Conserving Natural Resources," May 4-8, 1992, Beltsville, MD.

Descriptors: lakes-; water-reservoirs; global-warming;
carbon-dioxide; temperature-; dissolved-oxygen; size-; depth-;
turbidity-; phytoplankton-; seasonal-variation; water-quality;
simulation-models; water-temperature; trophic-status

Abstract: A deterministic, one-dimensional numerical simulation model for water temperature and dissolved oxygen (DO) in lakes of different size, depth, and trophic status has been formulated, validated, and applied to lakes in the north central USA. The standard error of predictions is on the order of 1 degree C for temperature and 1.5 mg L(-1) for DO. The model is driven by weather measurements at off-lake weather stations. Simulations can be made for the open water season at daily timesteps and for as many years as weather data are available without any parameter adjustments. The model has been used to simulate the effect of climate change due to a doubling of atmospheric CO2 on water temperatures and DO in 27 lake classes in Minnesota. The lakes

have been differentiated by surface area, maximum depth, and trophic status. Maximum water temperature near the surface is projected to increase by no more than 2 degrees C in midsummer, and DO will drop by less than 2 mg L(-1) in the surface waters but will remain above 7 mg L(-1). In contrast, hypolimnetic water temperature in midsummer may rise by as much as 4 degrees C or may become colder by as much as 4 degrees C. Hypolimnetic DO will be lower by as much as 8 mg L(-1) in midsummer and DO depletion is projected to occur for a longer period of time in midsummer in lakes with seasonal summer stratification. Changes will be largest in spring and fall because the summer stratification season will lengthen by 20 to 90 d for different lake types.

NAL Call No.: QH540.J6

90. Leachate geochemistry at a municipal landfill, Memphis, Tennessee.

Mirecki, J. E.; Parks, W. S.

Ground-water. Dublin, Ohio : Ground Water Pub. Co. May/June 1994. v. 32 (3) p. 390-398.

Includes references.

Descriptors: landfill-leachates; municipal-refuse-disposal; wells-; groundwater-; samples-; chemical-composition; concentration-; alluvium-; aquifers-; geochemistry-; models-; groundwater-pollution; tennessee-

NAL Call No.: TD403.G7

91. Long-term (15 years) results of NPS controls in an agricultural watershed upon a receiving lake's water quality.

Garrison, P. J.; Asplund, T. R.

Water-sci-technol v.28, p.441-449. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: watersheds-; agricultural-land; runoff-water; sediment-; nutrients-; prediction-; models-; pollution-control; phosphorus-; loads-; lakes-; water-quality; wisconsin-

NAL Call No.: TD420.A1P7

92. Measuring and modeling root water uptake based on 36chloride discrimination in a silt loam soil affected by groundwater.

Schmidhalter, U.; Selim, H. M.; Oertli, J. J.

Soil-sci v.158, p.97-105. (1994).

Includes references.

Descriptors: daucus-carota; roots-; water-uptake; measurement-; salinization-; groundwater-; saline-water; capillary-rise; water-table; soil-depth; models-; solutes-; transport-processes; chloride-; soil-water-content

NAL Call No.: 56.8-So3

93. Miscible displacement and theoretical techniques for simultaneous study of pesticide sorption and degradation during transport.

Gamerding, A. P.; Dowling, K. C.; Lemley, A. T.

SSSA-spec-publ p.115-123. (1993).

In the series analytic: Sorption and degradation of pesticides and organic chemicals in soil / edited by D.M. Linn, T.H. Carski, M.L. Brusseau and F.H. Chang. "chemicals in soils," held on October 30, 1991, Denver, Colorado.

Descriptors: pesticides-; transport-processes; models-; transformation-; sorption-; estimation-; techniques-

NAL Call No.: S590.S62

94. Model farms results reviewed as project nears an end.
Carver, N.

Inside-edge v.3, p.1-2. (1993).

Descriptors: water-quality; farms-; models-; residues-; project-appraisal; iowa-

NAL Call No.: S561.6.I8I572

95. Model of integrated effects of boron, inert salt, and water flow on crop yield.
Shani, U.; Hanks, R. J.

Agron-j v.85, p.713-717. (1993).

Includes references.

Descriptors: hordeum-vulgare; zea-mays; growth-models; mathematical-models; equations-; phytotoxicity-; boron-; salts-in-soil; soil-salinity; soil-water; water-flow; transport-processes; leaching-; available-water; crop-yield; yield-losses; simulation-models; utah-

Abstract: High boron concentration in the soil causes yield reduction. Recently, a piecewise linear response curve was applied to describe yield response to B in near steady-state conditions. However, application of similar curves to field situations where water, B, and other ion contents are transient and nonhomogeneous is limited. The objective of this study was to develop a model for simulation of the integrated effects of B, inert salt, and water on crop yield under field conditions. The model computes water flow in response to irrigation, rain, or evapotranspiration processes and subsequently computes inert salt and B transport. Crop yield is related to soil matric and osmotic potentials and B toxicity. Effects of B toxicity are considered by adapting the steady-state approach to the transient situation. Field experiments with barley (*Hordeum vulgare* L.) and corn (*Zea mays* L.) were conducted on the Utah Power & Light Co. research farm (Huntington, UT). Soil was Penoyer loam [coarse-silty, mixed (calcareous), mesic Typic Torriorthent]. Line source irrigation was used to obtain different irrigation levels. The effects of B, Salt mixture of Na, Ca, Cl, and SO₄, and B + Salt on yield were studied in barley. The effect of B + Salt was studied also in corn. Measurements and simulations were in close agreement for both crops. Barley yield ranked B + Salt < B < Salt < control. Corn yield ranked B + Salt < control. The B adsorption properties result in less leaching than do those of an inert ion like Cl. The effects of initial and boundary conditions together with the B adsorption characteristics on B concentration in the soil solution and the subsequent yield reduction are presented. This model can serve for an analysis of the long-term effects of high B and help in understanding the relative.

NAL Call No.: 4-AM34P

96. A model of nitrate leaching from agricultural systems in Virginia's Northern Neck.

Johnson, T. G.; Parker, J. C.

Blacksburg : Virginia Water Resources Research Center, Virginia Polytechnic Institute and State University, 1993. xviii, 308 p.. Includes bibliographical references (p. 125-137).

TD201.V57--no.179

97. Model simulations of dissolved oxygen characteristics of Minnesota

Stefan, H. G.; Fang, X.

Environ-manage. New York, Springer-Verlag. Jan/Feb 1994. v. 18 (1) p. 73-92.

Includes references.

Descriptors: lakes-; water-quality; dissolved-oxygen; simulation-models; climatic-change; minnesota-

NAL Call No.: HC79.E5E5

98. A modeling approach to evaluate best management practices.

Williams, R. D.; Nicks, A. D.

Water-sci-technol v.28, p.675-678. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: agricultural-land; crops-; river-water; water-pollution; protection-; soil-management; water-quality; improvement-; models-; usa-; vegetative-filter-strips

NAL Call No.: TD420.A1P7

99. Modeling mined land reclamation strategies in a GIS environment.

Younos, T. M.; Yagow, E. R.; Zipper, C. E.; Diplas, P.

Appl-eng-agric v.9, p.61-68. (1993).

Includes references.

Descriptors: mined-land; reclamation-; computer-software;

models-; erosion-control; environmental-impact; virginia-

Abstract: The erosion potential from mined lands is considered a major environmental threat. Mathematical models can be used to predict and demonstrate the effectiveness of various reclamation strategies for reducing erosion potential. The objective of this project was to use the Universal Soil Loss Equation (USLE) with a sediment yield component to evaluate the comparative effects of alternative reclamation strategies in a Geographic Information System (GIS) environment. The study site was an abandoned mined land (AML) site located in southwest Virginia. Topographic and landuse information for the site were obtained from topographic maps, aerial photographs, and field observation. The GIS tools were used to create digital data layers, store, analyze, and display information. The USLE factors were spatially derived from elevation, landuse, surface-water system, and watershed boundary data layers. The basic and derived data layers were then used to

estimate the magnitude of soil loss and sediment yield. The methodology was used to predict the soil loss and sediment yield at the existing AML site, and to compare the effectiveness of three reclamation options for reducing soil loss and sediment yields. Results demonstrate the usefulness of the GIS tools for planning land reclamation strategies.

NAL Call No.: S671.A66

100. Modeling mobility and effects of contaminants in wetlands.
Dixon, K. R.; Florian, J. D. Jr.

Environ-toxicol-chem v.12, p.2281-2292. (1993).

Annual Review Issue: Wetland Ecotoxicology and Chemistry.

Descriptors: wetlands-; simulation-models; contaminants-; pollutants-; transport-processes; literature-reviews

NAL Call No.: QH545.A1E58

101. Modeling subsurface drainage and surface runoff with WEPP.
Savabi, M. R.

J-irrig-drain-eng v.119, p.801-813. (1993).

Includes references.

Descriptors: subsurface-drainage; surface-drainage; erosion-; erosion-control; models-; water-erosion-prediction-project

NAL Call No.: 290.9-AM3Ps-IR

102. Modeling the effects of salt-water intrusion dynamics for a coastal karstified block connected to a detrital aquifer.
Calvache, M. L.; Pulido Bosch, A.

Ground-water. Dublin, Ohio : Ground Water Pub. Co. Sept/Oct 1994.
v. 32 (5) p. 767-777.

Includes references.

Descriptors: aquifers-; coastal-areas; saline-water; contamination-; groundwater-flow; landforms-; simulation-models; mathematical-models; water-quality; salinization-; groundwater-pollution; spain-

NAL Call No.: TD403.G7

103. Modeling the transport of solutes to groundwater using transfer functions.
Roth, K.; Jury, W. A.

J-environ-qual v.22, p.487-493. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research Center Symposium XVII, "Agricultural Water Quality Priorities, A Team Approach to Conserving Natural Resources," May 4-8, 1992, Beltsville, MD.

Descriptors: solutes-; transport-processes; chemicals-; unsaturated-flow; groundwater-; mathematical-models

Abstract: Transport of chemicals through the unsaturated zone into groundwater is in general a highly nonlinear process with a pronounced spatial structure of which only a very limited number of measurements is economically and technically feasible. In most applications, it is thus not practicable to model these processes with high spatial and temporal resolutions. However, in an agricultural environment chemicals are usually applied to large

areas, and we are generally interested in their long-term effects on groundwater quality. With these restrictions, the transport processes may be averaged in space and time over sufficiently large regions such that it may be permissible to use a stationary, linear approximation. An efficient way to study such systems exploits that a stationary, linear system is completely determined by its transfer function, that is, by its response to a narrow pulse input. We use a general formalism to represent the transport processes implicitly by the relation between the flux and the resident concentration of a conservative chemical. To model the transport of nonconservative chemicals, this description is coupled, as it was done by (Villiermaux, 1981), with a model of the local interactions. We obtain an expression for the transfer function of a linearly adsorbing chemical with linear adsorption kinetics and first-order decay in the water and in the adsorbed phase which is based on the measured transfer function of a conservative tracer. This procedure has the major advantage that parameter estimation and model validation tests can be applied to the chemical reaction processes alone. KEEP.
NAL Call No.: QH540.J6

104. Movement of nitrogen through and agricultural riparian zone.
2. Distributed modeling.
Nikolaidis, N. P.; Shen, H.; Heng, H.; Hu, H. L.; Clausen, J. C.

Water-sci-technol v.28, p.613-623. (1993).
Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.
Descriptors: riparian-forests; pollutants-; sources-; nitrogen-; groundwater-pollution; surface-water; water-pollution; movement-in-soil; mathematical-models; connecticut-
NAL Call No.: TD420.A1P7

105. New models for unsaturated soil hydraulic properties.
Zhang, R.; Genuchten, M. T. v.

Soil-sci v.158, p.77-85. (1994).
Includes references.
Descriptors: soil-water-retention;
unsaturated-hydraulic-conductivity; mathematical-models;
solutes-; transport-processes; water-flow
NAL Call No.: 56.8-So3

106. NLEAP simulation of residual soil nitrate for irrigated and nonirrigated corn.
Follett, R. F.; Shaffer, M. J.; Brodahl, M. K.; Reichman, G. A.

J-soil-water-conserv v.49, p.375-382. (1994).
Commentary.
Descriptors: zea-mays; sandy-soils; irrigated-conditions;
soil-water-regimes; nitrogen-fertilizers; application-rates;
nitrate-; residues-; leaching-; nitrogen-; nutrient-uptake;
precipitation-; seasonal-variation; simulation-models;
crop-yield; nitrate-leaching-and-economic-analysis-package;
nutrient-management
NAL Call No.: 56.8-J822

107. Nondestructive determination of hydrogeometrical characteristics of soil macropores.

Wang, D.; Norman, J. M.; Lowery, B.; McSweeney, K.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Mar/Apr 1994. v. 58 (2) p. 294-303.

Includes references.

Descriptors: macropores-; characterization-; nondestructive-testing; dimensions-; water-flow; macropore-flow; transport-processes; mathematical-models

Abstract: Hydrological and geometrical parameters of macropores are essential for modeling water and solute transport through soils containing macropores. This study was conducted to develop a fast and nondestructive technique for determining the hydrological and geometrical characteristics of soil macropores. We measured the rate of water flowing into ant and earthworm burrows with a macropore infiltrometer and estimated burrow diameter, volume, and depth from the measured flow rate and a water flow model. To evaluate the estimated burrow parameters, we made castings of the ant and earthworm burrows with a dental plaster. The burrows had similar diameters (2.1 mm for laminar flow; 2.9 mm for turbulent flow) but different volumes and depths [281-cm(3) volume and 0.60-m depth for ant burrows; 210-cm(3) volume and 0.82-m depth for earthworm burrows]. This technique is reasonable for ant burrows because the root mean square difference (RMSD) between casting and infiltrometer-calculated volumes is 17%; however, errors are larger for earthworm burrows (RMSD is 73%). Saturated soil matrix hydraulic conductivity [K(s)] estimated from the infiltrometer measurement of earthworm burrows were comparable to matrix K(s) of the bulk silt loam. The matrix K(s) values estimated for ant burrows were about eight times smaller than matrix K(s) of the bulk sandy soil. Such large decrease in K(s) is probably caused by infilling of burrow walls by ants with fine materials. Combining the macropore infiltrometer measurements with the model is a useful means of estimating the hydrological and geometrical parameters of ant and possibly earthworm burrows.

NAL Call No.: 56.9-So3

108. Nonpoint source (NPS) pollution modeling using models integrated with geographic information systems (GIS).

Engel, B. A.; Srinivasan, R.; Arnold, J.; Rewerts, C.; Brown, S. J.

Water-sci-technol v.28, p.685-690. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: pollution-; sources-; watersheds-; rain-; agricultural-chemicals; runoff-water; water-pollution; water-erosion; geographical-information-systems; models-; usa-; chemicals,-runoff,-and-erosion-from-agricultural-managementsystems

NAL Call No.: TD420.A1P7

109. Nonpoint sources.

Line, D. E.; Osmond, D. L.; Coffey, S. W.; Arnold, J. A.; Gale,

J. A.; Spooner, J.; Jennings, G. D.

Water-environ-res v.66, p.585-601. (1994).

Includes references.

Descriptors: water-pollution; soil-pollution; water-quality;
water-resources; pollutants-; pesticides-; biodegradation-;
pollution-control; models-; monitoring-; literature-reviews

NAL Call No.: TD419.R47

110. Numerical approach to the overland flow process in
vegetative filter strips.

Munoz Carpena, R.; Parsons, J. E.; Gilliam, J. W.

Trans-ASAE v.36, p.761-770. (1993).

Includes references.

Descriptors: erosion-control; overland-flow; pollution-control;
runoff-; sediment-; shelterbelts-; simulation-models;
water-pollution; mathematical-models; north-carolina

Abstract: Agricultural and other disturbed lands contribute to
non-point source pollution of water bodies (streams and lakes).
Vegetative filter strips (VFS) are often recommended to reduce
off-site impacts. Design guidelines to optimize performance of
VFS are not readily available. A process-based model is presented
to simulate the hydrology of a Vegetative Filter Strip for a
given event. The model consists of a quadratic finite element
overland flow submodel, based on the kinematic wave
approximation, coupled with an infiltration submodel based on a
modification of the Green-Ampt equation for unsteady rainfall.
The model is used to study the effect of soil type, stope,
surface roughness, buffer length, storm pattern and field inflow
on the VFS performance. Filter performance, i.e., reduction of
the runoff volume, velocity and peak, is higher for denser grass
cover, smaller slopes and soils with higher infiltration
capacity. Time to peak(s) depended mainly on the roughness-slope
combination.

NAL Call No.: 290.9-Am32T

111. Observed and simulated transport of a conservative tracer
under line-source irrigation.

Comfort, S. D.; Inskeep, W. P.; Lockerman, R. H.

J-environ-qual v.22, p.554-561. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research
Center Symposium XVII, "Agricultural Water Quality Priorities, A
Team Approach to Conserving Natural Resources," May 4-8, 1992,
Beltsville, MD.

Descriptors: solutes-; transport-processes; soil-water-regimes;
irrigation-; soil-depth; simulation-models;
agricultural-chemicals; silt-loam-soils; montana-; vadose-zone;
leachm-simulation-model

Abstract: Although a number of solute transport models are
currently available to predict the transport of agrichemicals in
the vadose zone, validation of these models under field
conditions has been limited. This study monitored the transport
of a conservative tracer (Br-) under three water regimes (high,
medium, and low) imposed by a line-source irrigation system and
tested the validity of the simulation model, LEACHM, to predict

Br- transport. In July 1990, RbBr was surface applied to 12 uncropped columns at 56 kg Br- ha(-1). Four columns (0.203-m diam., 1.2-m length) were positioned in each water regime and equipped with soil solution samplers at .36-, 0.66-, and 0.96-m depths. Soil solution samples were taken 20 times over 80 d to monitor Br- transport. Cumulative water applied to each water regime, by irrigation and precipitation, ranged between 251 and 458 mm. Results indicated dramatic differences in Br- transport among water regimes. Complete Br- breakthrough curves (with apex concentrations of approximately 60 mg Br- L(-1)) were observed under high water regime at all depths whereas the majority of Br- applied to the low water regime remained at or near the 0.36-m depth. Inputs used to predict Br- transport in LEACHM simulations were either measured directly or estimated from experimental conditions. To simulate Br- transport for each water regime, we used three LEACHM input files, which reflected the variability of the soil profile water release retention coefficients. Results indicated that LEACHM's predictions of Br- concentration (at all depths and under all water regimes) differed from observed means by an average (n = 180) of 9.0 to 9.4 mg Br- L(-1) (approximately 15-16% of the average apex concentrations). These results indicate that under the experimental system studied, LEACHM. vadose zone.

NAL Call No.: QH540.J6

112. One-dimensional infiltration with moving finite elements and improved soil water diffusivity.

Cox, C. L.; Jones, W. F.; Quisenberry, V. L.; Yo, F.

Water-resour-res v.30, p.1431-1438. (1994).

Includes references.

Descriptors: soil-water; solutes-; diffusivity-; infiltration-; transport-processes; mathematical-models; transport-models

Abstract: A problem of significant interest to environmental scientists is the flow of water and solutes through the vadose zone. The partial differential equations which govern this flow are typically time-dependent and nonlinear. Valid solutions to these equations require (1) accurate relationships between various coefficients and variables on which they depend (e.g., coefficient of diffusivity and water content) and (2) sophisticated numerical methods which can handle complexities such as sharp moving fronts. In cases where coefficients are not known explicitly, curve-fitting techniques are needed to smooth out scattered experimental data. Nonlinear coefficients can then be calculated. A constrained least squares spline fit is compared to empirical function fits which have appeared recently. Then, a state-of-the-art numerical technique is used to accurately model transient flow through unsaturated homogeneous soils. The moving finite element method of Miller and colleagues is an adaptive approach in the sense that the grid moves so that nodes are concentrated where they are most needed. As a result, better accuracy is achieved with fewer nodes than are required for standard fixed-grid methods. Petzold's robust Gear-type solver DASSL is used for time-integration. Numerical results are compared to experimental data. Mass balance errors are negligible, and accurate solutions are obtained at all time steps. Though only one-dimensional problems are considered here,

the numerical approach generalizes to heterogeneous media and problems in higher dimensions.

NAL Call No.: 292.8-W295

113. Outdoor testing of the condensation characteristics of plastic film covering materials using a model greenhouse.

Geoola, F.; Peiper, U. M.; Geoola, F.

J-agric-eng-res v.57, p.167-172. (1994).

Includes references.

Descriptors: greenhouses-; plastic-film; cladding-; field-tests; solar-radiation; light-transmission; condensation-; runoff-water; round-arch-greenhouses; transparency-loss; film-ageing

NAL Call No.: 58.8-J82

114. Parameter identification for a runoff model for forest roads.

Luce, C. H.; Cundy, T. W.

Water-resour-res v.30, p.1057-1069. (1994).

Includes references.

Descriptors: forests-; roads-; runoff-; erosion-; infiltration-; overland-flow; rain-; simulation-; algorithms-; idaho-; colorado-; montana-

Abstract: Rainfall simulation is a commonly used approach for studying runoff and erosion from forest roads, and a method is needed to estimate infiltration parameters from these experiments. We used two algorithms, the Simplex and Shuffled Complex Evolution, to estimate parameters for a physically based infiltration and overland flow model. Each algorithm was tested by estimating parameters for 92 field-measured hydrographs from forest roads. Nine of the field-measured hydrographs allowed us to further test whether estimated parameters could be extended to other antecedent conditions and plot sizes. The results demonstrate (1) the physically based model is able to estimate hydrographs from forest roads, (2) the two algorithms find unique parameter sets in spite of an error surface that suggests identifiability problems between the hydraulic conductivity and pressure parameters, (3) the two algorithms converged to the same parameter values, and (4) that parameters estimated for one antecedent condition and plot size can be extended to others with reasonably small error.

NAL Call No.: 292.8-W295

115. Pesticide leaching data to validate simulation models for registration purposes.

Bergstrom, L.; Jarvis, N.; Stenstrom, J.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1073-1104. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: dichlorprop-; leaching-; sandy-soils; loam-soils; clay-soils; simulation-models; bentazone-

NAL Call No.: TD172.J6

116. Point/nonpoint source trading of pollution abatement:

choosing the right trading ratio.
Malik, A. S.; Letson, D.; Crutchfield, S. R.

Am-j-agric-econ v.75, p.959-967. (1993).

Includes references.

Descriptors: pollution-control; law-enforcement; costs-; water-quality; trading-; uncertainty-; mathematical-models; ratios-; usa-; abatement-costs

Abstract: In programs for trading pollution abatement between point and nonpoint sources, the trading ratiospecifies the rate at which nonpoint source abatement can be substituted for point sourceabatement. The appropriate value of this ratio is unclear because of qualitative differencesbetween the two classes of sources. To identify the optimal trading ratio, we develop and analyzea model of point/nonpoint trading. We find the optimal trading ratio depends on the relativecosts of enforcing point versus nonpoint reductions and on the uncertainty associated with nonpoint loadings. The uncertainty does not imply a lower bound for the optimal trading ratio.

NAL Call No.: 280.8-J822

117. Potassium and phosphorus uptake by competing pine and grass: observations and model verification.

Smethurst, P. J.; Comerford, N. B.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Nov/Dec 1993. v. 57 (6) p. 1602-1610.

Includes references.

Descriptors: pinus-elliottii; seedlings-; panicum-; plant-competition; interspecific-competition; potassium-; phosphorus-; nutrient-uptake; computer-simulation; simulation-models; root-systems; surface-area; transport-processes; soil-fertility; pinus-elliottii-var; -elliottii; panicum-aciculare

Abstract: A computer model (COMP8) was recently presented that simulates nutrient uptake by competing andsingle root systems. However, the model needed independent verification. Our objectives here wereto: (i) determine if uptake by each species was a simple function of each species' root surface area, and (ii) verify COMP8 for K and P uptake by slash pine (*Pinus elliottii* Engelm. var.*elliottii*) seedlings in competition with *Panicum aciculare* Desv. ex Poir. in Lam. grass plants. Pine and grass plants were grown together at low and high initial soil-solution concentrations. Observed and predicted uptake values were compared by linear regression and by t tests using variances predicted by Monte Carlo analysis. For high initial solution conditions, wequantitatively predicted pine uptake for all cases of P and for three of four cases for K. Grass Kuptake was accurately predicted in all three cases; however, none of the three cases of grassuptake of P were correct. For the low initial solution concentrations, only one case of pine andno cases of grass uptake were predicted accurately. For neither K nor P was uptake by pine(expressed as a percentage of that taken up by pine and grass combined) in a 1:1 relationship withthe percentage of surface area in pine roots. We conclude that uptake by the competing rootsystems is not a simple function of their relative root surface areas and

that COMP8 provides anadequate description of nutrient uptake by competing and contrasting root systems under certain.

NAL Call No.: 56.9-So3

118. A pragmatic field-scale approach for modeling pesticides.
Hutson, J. L.; Wagenet, R. J.

J-environ-qual v.22, p.494-499. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research Center Symposium XVII, "Agricultural Water Quality Priorities, A Team Approach to Conserving Natural Resources," May 4-8, 1992, Beltsville, MD.

Descriptors: pesticides-; leaching-; soil-water-movement; simulation-models

Abstract: Environmental assessments of the fate of pesticides and other agricultural chemicals usually require estimation of chemical concentrations, with some indication of their accuracy. These estimations are usually based on a few measurements combined with existing data bases and predictive tools that include regression equations, empirical relationships, and simulation models. Comprehensive simulation models are attractive from a scientific standpoint, since they consider leaching of the chemical by water as well as the various chemical, biological, and physical processes that affect the chemical's fate during its transport. A number of simulation modeling approaches have been developed to describe soil-water-chemical systems, but a fundamental question remains regarding the degree of model complexity required to simulate agrochemical movement to groundwater. Most model complexity in soil-water-chemical simulation models arises from the manner in which water flow and chemical transport are considered. It is therefore logical, especially for management purposes, to consider alternative, pragmatic, and yet sufficiently accurate approaches to the description of water flow and chemical transport. Such approaches would require less characterization of soil hydraulic and physical/chemical properties and would reduce computation time. A method for such simplification and use is described, starting with LEACHP, a model based on the Richards and convection-dispersion equations. The resulting model is shown to be sufficiently accurate for many management decisions.

NAL Call No.: QH540.J6

119. Predicting attainable water quality using the ecoregional approach.
Schonter, R.; Novotny, V.

Water-sci-technol v.28, p.149-158. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: water-quality; body-water; protection-; integrated-systems; water-resources; water-management; ecosystems-; prediction-; models-; wisconsin-; integrated-water-resource-management; ecoregional-nonpoint-source-model

NAL Call No.: TD420.A1P7

120. Predicting bromide leaching under field conditions using slim and macro.

Jabro, J. D.; Jemison, J. M. Jr.; Fox, R. H.; Fritton, D. D.

Soil-sci v.157, p.215-223. (1994).

Includes references.

Descriptors: agricultural-chemicals; leaching-; movement-in-soil; macropore-flow; simulation-models; computer-simulation; groundwater-pollution; risk-; prediction-; preferential-flow

NAL Call No.: 56.8-So3

121. Predicting spatial distributions of nitrate leaching in northeastern Colorado.

Wylie, B. K.; Shaffer, M. J.; Brodahl, M. K.; Dubois, D.; Wagner, D. G.

J-soil-water-conserv v.49, p.288-293. (1994).

Includes references.

Descriptors: agricultural-land; nitrate-nitrogen; leaching-; spatial-distribution; groundwater-pollution; nitrate-; contamination-; prediction-; simulation-models; geographical-information-systems; point-sources; colorado-; non-point-source-pollution

NAL Call No.: 56.8-J822

122. Predicting water yield from a mountain ash forest catchment using a terrain analysis based catchment model.

Vertessy, R. A.; Hatton, T. J.; O'Shaughnessy, P. J.; Jayasuriya, M. D. A.

J-hydrol v.150, p.665-700. (1993).

In the special issue: Water Issues in Forests Today / edited by E.M. O'Loughlin and F.X. Dunin. November 22-26, 1992, Canberra, Australia.

Descriptors: mountain-forests; eucalyptus-regnans; water-yield; simulation-models; catchment-hydrology; evapotranspiration-; water-balance; soil-water; interception-; runoff-; stream-flow; australia-

Abstract: The structure, capabilities and performance of a distributed parameter hydrologic model are described. The model, called Topog-Yield, permits a transient analysis of unsaturated-saturated flow and evapotranspiration to be performed across complex terrain using a one-dimensional framework. It is applied to a 0.32 km² mountain ash (*Eucalyptus regnans*) forest catchment in the central Victorian highlands, Australia. We compare observed and predicted daily runoff values for the site over a continuous 12 year period (1972-1983) when the catchment vegetation was in an undisturbed climax condition. All input parameter values were based on published or measured data, although some variables were adjusted within the range of known variability to yield a best fit between predicted and observed streamflow in the first year of simulation, 1972. Although the model was 'calibrated' for the first year, all variables other than climatic inputs remained fixed for the following 11 years. Modelled and observed daily runoff values compare well throughout the period of simulation, despite a wide range of climatic conditions. When modelled daily runoff values were lumped on a

monthly basis, the model was able to explain 87% of the variation in observed monthly streamflows over the 12 year period. Modelled annual runoff was within +/- 5% of observed values for 6 of the 12 years of record. Annual runoff prediction errors exceeded +/- 10% of observed values in only 2 of the 12 years. By the end of the 12 year simulation, the model had over-predicted runoff by less than 5%. Input data requirements and model results are discussed in the light of a preliminary sensitivity analysis.

NAL Call No.: 292.8-J82

123. Preferential transport of nitrate through soil columns containing root channels.

Li, Y.; Ghodrati, M.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1994. v. 58 (3) p. 653-659.

Includes references.

Descriptors: nitrate-; transport-processes; movement-in-soil; macropore-flow; root-channels; mathematical-models; comparisons-; preferential-flow

Abstract: Preferential flow has been increasingly recognized as an important mechanism for water and solute transport. The objectives of this study were to characterize transport of through root channels in uniformly packed soil columns and to compare three commonly used solute transport models in describing NO₃ transport through the soil-root channel columns. Root channels were created by growing corn (*Zea mays* L.) or alfalfa (*Medicago sativa* L.) in 0.6-m-long soil columns. Transport of Was then systematically studied with each of these macropore systems at a range of fluxes (from 0.042K(sm) to 0.47K(sm), where K(sm) is the saturated hydraulic conductivity of the macroporous system). A nonlinear least-squares program was used to fit the convection-dispersion equation (CDE), the physical nonequilibrium model (MIM) and a stochastic model (SM) to the experimental data. The results show that significant preferential movement of NO₃ occurred in the decayed root channels at fluxes as low as 0.042K(sm). The MIM model provided a better description of the breakthrough curves than the CDE and the SM, while none of them were adequate to predict the preferential movement of the solute.

NAL Call No.: 56.9-So3

124. Proceedings of the Symposium on Geographic Information Systems and Water Resources.

Harlin, J. M.; Lanfear, K. J.; Symposium on Geographic Information Systems and Water Resources (1993 : Mobile, A.

Bethesda, Md. : American Water Resources Association, c1993. xvi, 640 p. : ill. (some col.), maps (some col.).

Includes bibliographies and indexes.

Descriptors: Geographic-information-systems; Water-supply-

NAL Call No.: TC401.A5-no.93-1

125. Progress in the understanding of runoff generation dynamics in forests.

Bonell, M.

J-hydrol v.150, p.217-275. (1993).

In the special issue: Water Issues in Forests Today / edited by E.M. O'Loughlin and F.X. Dunin. November 22-26, 1992, Canberra, Australia.

Descriptors: tropical-forests; runoff-; sloping-land; humid-tropics; hydrology-; research-; simulation-models; literature-reviews

Abstract: This work reviews the runoff generation process in forests. A survey of the delivery mechanisms of hillslope runoff and the difficulties of incorporating some of them in recent physically based models is considered. The research challenge in reconciling the results from recent stream hydrogeochemistry studies with the results from previous hillslope hydrometric experiments is also highlighted. 'Physically based' runoff process models for application to forest land management problems are then summarised. The work concludes by proposing a new, intensive phase in experimental hydrology which should support the continued development of new algorithms in runoff process modelling. Particular attention should be given to tropical forests and the need for additional hillslope hydrology research to address the important issues associated with hillslope management and conversion.

NAL Call No.: 292.8-J82

126. A prototype shell for running field scale natural resource simulation models.

Hernandez, M.; Heilman, P.; Lane, L. J.; Stone, J. J.; Abolt, J. A.; Masterson, J. E. II.

Application of advanced information technologies effective management of natural resources proceedings of the 18-19 June 1993 Conference, Spokane, Washington /. St. Joseph, Mich. : American Society of Agricultural Engineers, c1993.. p. 142-149. Includes references.

Descriptors: water-quality; decision-making; simulation-models; interface-; design-; usda-; usa-; agricultural-research-service

NAL Call No.: GE5.A66-1993

127. Quantifying soil erosion for the Shihmen Reservoir watershed, Taiwan.

Lo, K. F. A.

Agric-syst v.45, p.105-116. (1994).

Includes references.

Descriptors: watersheds-; erosion-; sediment-; nutrients-; flow-; transport-processes; sediment-yield; simulation-models; taiwan-; agnps-model-agricultural-non-point-source-pollution

NAL Call No.: HD1.A3

128. Real-time flood forecasting in mountainous river basins with long- and short-term runoff model.

Islam, M. N.; Nagai, A.; Yomota, A.

J-irrig-eng-rural-plann p.48-66. (1994).

Includes references.

Descriptors: flooding-; runoff-; hydrological-data; filters-; simulation-; forecasting-; optimization-; models-; mountain-areas; comparisons-; japan-

NAL Call No.: S671.J68

129. Regional scale ground water quality monitoring : methods and case studies.

Hudak, P. F.; Loaiciga, H. A.; Marino, M. A.; California Water Resources Center.

[Riverside, Calif.] : California Water Resources Center, 1993.

xi, 74 p. : ill., maps.

"April, 1993."

Descriptors: Water-quality-management-Mathematical-models;

Water-quality-management-Methodology;

Water-quality-management-Case-studies; Ground-water-Quality

NAL Call No.: GB705.C2C676--no.203

130. Regulation of nitrogen pollution in agriculture.

Johnson, S. R. 1.; United States Israel Binational Agricultural Research and Development Fund.

Bet Dagan, Israel : BARD, 1994. 223 leaves : ill..

Final report.

Descriptors: Nitrogen-fertilizers-Control-Mathematical-models

NAL Call No.: S651.R43--1994

131. Removing numerically induced dispersion from finite difference models for solute and water transport in unsaturated soils.

Moldrup, P.; Yamaguchi, T.; Rolston, D. E.; Vestergaard, K.; Hansen, J. A.

Soil-sci v.157, p.153-161. (1994).

Includes references.

Descriptors: solutes-; soil-water; transport-processes;

simulation-models; mathematical-models; calculation-; errors-;

correction-factors; calculation-schemes

NAL Call No.: 56.8-So3

132. Risk versus economic return in managing groundwater nitrate contamination.

Adelman, D. H.; Dahab, M. F.

Water-sci-technol v.28, p.55-63. (1993).

Paper presented at the IAWQ First International Conference on

"Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: groundwater-pollution; nitrates-; farm-management;

farming-; techniques-; prediction-; decision-making; models-;

returns-; irrigated-farming; irrigation-water; utilization-;

nitrogen-fertilizers; application-rates; nebraska-

NAL Call No.: TD420.A1P7

133. Root zone effects on tracer migration in arid zones.

Tyler, S. W.; Walker, G. R.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of

America. Jan/Feb 1994. v. 58 (1) p. 25-31.

Paper presented at the Symposium on "Recharge in arid and

semiarid regions," October 28-30, 1991, Denver, Colorado.
Descriptors: groundwater-recharge; estimation-; soil-water;
root-zone-flux; transport-processes; mathematical-models;
arid-zones; tracer-techniques; errors-

Abstract: The study of groundwater recharge and soil water movement in arid regions has received increased attention in the search for safe disposal sites for hazardous wastes. In passing through the upper 1 to 2 m of most soil profiles, tracers indicative of recharge such as Cl, 2H, 18O, Br, 3H, and 36Cl are subjected to a wide range of processes not encountered deeper in the profile. This transition zone, where water enters as precipitation and leaves as recharge, is often ignored when environmental tracers are used to estimate deep soil water flux and recharge, yet its effect may be profound. In this work, we reexamine the processes of root extraction and its effect on the velocity and distribution of tracers. Examples are presented for idealized conditions, which show clearly the relation between the root zone processes and the deep drainage or recharge. The results indicate that, when recharge is small and root zone processes are not accounted for, tracer techniques can significantly overestimate recharge until the tracer has moved well below the root zone. By incorporating simple models of root zone processes, a clearer understanding of tracer distributions and a more accurate estimate of recharge can then be made.

NAL Call No.: 56.9-So3

134. Runoff changes simulated using a rainfall-runoff model.

Buchtele, J.

Water-resour-manag v.7, p.273-287. (1993).

Includes references.

Descriptors: runoff-; change-; rivers-; rain-; watersheds-;
simulation-models; climatic-change; czechoslovakia-

Abstract: The Sacramento rainfall-runoff model has been used in experiments with 60 year daily series for the Czech part of the Labe River basin; simulations with decreased and/or increased inputs (precipitations, air temperature, evapotranspiration) provide results that could be used to appraise the runoff changes due to climatic warming. Simulations with the modified parameters are used for evaluation of runoff changes caused by land-use changes. For both purposes, the long-term data sets appear to be desirable; it is then possible to take into account 'accidental' influences. The simulations also provide, as an output, the water contents in different zones of soil moisture; the relationships among evapotranspiration, soil moisture, and baseflow clearly appear in these results.

NAL Call No.: TC401.W27

135. Runoff hydrograph estimation using artificial neural networks.

Hjelmfelt, A. T. Jr.; Wang, M.

Application of advanced information technologies effective management of natural resources proceedings of the 18-19 June 1993 Conference, Spokane, Washington /. St. Joseph, Mich. : American Society of Agricultural Engineers, c1993.. p. 315-320.
Includes references.

Descriptors: runoff-; rain-; hydrology-; models-; prediction-;
algorithms-; simulation-models; missouri-; rainfall-runoff-models
NAL Call No.: GE5.A66-1993

136. RUSLE model description and database sensitivity.
Renard, K. G.; Ferreira, V. A.

J-environ-qual v.22, p.458-466. (1993).
Paper presented at the USDA-ARS Beltsville Agricultural Research
Center Symposium XVII, "Agricultural Water Quality Priorities, A
Team Approach to Conserving Natural Resources," May 4-8, 1992,
Beltsville, MD.

Descriptors: surface-water; water-quality; simulation-models;
computer-software; revised-universal-soil-loss-equation-model
Abstract: Water quality modeling generally requires estimates of
the amount of eroded material entering water courses. This
information is necessary because sediment often transports
adsorbed chemicals. Numerous models have been developed to assist
with assessment of this problem. These models often contain some
modification of the Universal Soil Loss Equation (USLE). A
recently initiated effort to improve USLE technology has produced
a computer-based model, RUSLE (Revised USLE), which employs new
relationships to estimate values of the six factors in the
equation. Three input databases are

NAL Call No.: QH540.J6

137. Selection of herbicide alternatives based on probable
leaching to groundwater.
Franklin, R.; Quisenberry, V. L.; Gossett, B. J.; Murdock, E. C.

Weed-technol v.8, p.6-16. (1994).
Includes references.

Descriptors: water-quality; groundwater-pollution; herbicides-;
leaching-; weed-control; chemical-control; coastal-plain-soils;
movement-in-soil; estimation-; persistence-; prediction-;
mathematical-models; south-carolina

NAL Call No.: SB610.W39

138. A semi-analytical solution for one-dimensional solute
transport in soils.
Yamaguchi, T.; Moldrup, P.; Rolston, D. E.; Peterson, L. W.

Soil-sci v.158, p.14-21. (1994).
Includes references.

Descriptors: solutes-; transport-processes; mathematical-models;
moving-concentration-slope-models

NAL Call No.: 56.8-So3

139. Similarity analysis of runoff generation processes in
real-world catchments.
Larsen, J. E.; Sivapalan, M.; Coles, N. A.; Linnet, P. E.

Water-resour-res v.30, p.1641-1652. (1994).
Includes references.

Descriptors: runoff-; watersheds-; agricultural-land;
quantitative-analysis; prediction-; rain-; simulation-models;
western-australia; rainfall-runoff-models;

eastern-wheat-belt-of-western-australia

Abstract: This paper addresses the question of similarity of runoff generation processes between catchments in the eastern wheat belt of Western Australia, and the use of dimensionless parameterizations to quantify this similarity. A spatially distributed rainfall-runoff model, simulating runoff generation by both the infiltration excess (Horton type) and saturation excess (Dunne type) mechanisms, was developed for catchments in the region. Seven small experimental catchments, with field-measured soil hydraulic properties and topography, were used in the study. Following on from the similarity theory developed by Sivapalan et al. (1987), a number of dimensionless similarity parameters were constructed using the field-measured soil and topographic properties, a characteristic length scale, and a characteristic flow velocity. The objective was to determine whether the dominant runoff generation mechanism on a catchment could be reliably predicted by these similarity parameters. This was achieved through sensitivity analyses carried out with the rainfall-runoff model. Two dimensionless parameters, $K(* / 0)$ and f^* , were found to be critical for characterizing the similarity or dissimilarity of the runoff generation responses between the seven experimental catchments. Within the assumptions of the analysis, two catchments in the wheat belt region can be considered to be hydrologically similar, in terms of their runoff responses, if $K(* / 0)$ and f^* are identical in both catchments. The dominant mechanism of runoff generation on any catchment can be reliably predicted, provided that the values of $K(* / 0)$ and f^* are known. A partial quantification of the Dunne diagram. excess and saturation excess mechanisms, was achieved by artificially varying $K(* / 0)$ and f^* in the rainfall-runoff model to explore the full range of possible runoff generation responses.

NAL Call No.: 292.8-W295

140. A simple energy budget algorithm for the snowmelt runoff model.

Kustas, W. P.; Rango, A.; Uijlenhoet, R.

Water-resour-res v.30, p.1515-1527. (1994).

Includes references.

Descriptors: runoff-; meltwater-; energy-balance;

solar-radiation; algorithms-; prediction-; simulation-models

Abstract: The snowmelt runoff model (SRM) uses a degree-day approach for melting snow in a basin. A simple radiation component was combined with the degree-day approach (restricted degree-day method) in an effort to improve estimates of snowmelt and reduce the need to adjust the melt factor over the ablation season. A daily energy balance model was formulated that requires not only the input of radiation but also measurements of daily wind speed, air temperature, and relative humidity. The three approaches for computing snowmelt, namely, the degree-day, restricted degree-day, and daily energy balance model were tested at the local scale by comparing melt rates with lysimeter outflow measurements. Because radiation measurements are not often available, a simple model for simulating shortwave and longwave components of the radiation balance that requires minimal information (i.e., daily cloud cover estimates, air temperature,

and relative humidity) was developed. It was found that clouds and their effects on daily insolation at the surface can produce significant differences between measured and model estimates. In the comparisons of snowmelt estimates with the lysimeter outflow, the restricted degree-day method yielded melt rates that were in better agreement with the observed outflow than the degree-day method and were practically the same as estimates given by the energy balance model. A sensitivity analysis of runoff generated with SRM using as input the local snowmelt computations given by the three models and measured outflow from the lysimeter was performed for a basin. A comparison of the synthetic hydrographs for the basin suggests that a radiation-based snowmelt factor may improve runoff predictions at the basin scale.

NAL Call No.: 292.8-W295

141. Simulating acidification and recovery processes in experimental catchments with the ILWAS model.

Eary, L. E.; Jenne, E. A.; Vail, L. W.

Water-air-soil-pollut v.74, p.29-63. (1994).

Includes references.

Descriptors: acid-deposition; acidification-; watersheds-; soil-chemistry; simulation-models; mathematical-models; discharge-; cations-; ion-exchange; surface-water; water-quality; cation-exchange-capacity; norway-; base-cations; deacidification-

NAL Call No.: TD172.W36

142. Simulating funnel-type preferential flow and overall flow property induced by multiple soil layers.

Ju, S. H.; Kung, K. J. S.

J-environ-qual v.22, p.432-442. (1993).

Paper presented at the USDA-ARS Beltsville Agricultural Research Center Symposium XVII, "Agricultural Water Quality Priorities, A Team Approach to Conserving Natural Resources," May 4-8, 1992, Beltsville, MD.

Descriptors: sandy-soils; soil-water-movement; unsaturated-flow; transport-processes; mathematical-models; simulation-models

Abstract: Funnel-type preferential flow was observed in Plainfield sand (sandy, mixed, mesic Typic Udipsamment) of central Wisconsin. The objective of this paper was (i) to develop a numerical model based on the Richards equation and finite element scheme to simulate this preferential flow in a soil profile with inclined layers, and (ii) to determine flow properties in a soil with funnel-type preferential paths. The model was first validated by testing against two-dimensional (2-D) laboratory results and then used to simulate water flow patterns in hypothetical 2D soil profiles made of medium sand with multiple randomly distributed inclined coarse layers. The following results were found from the numerical experiments: (i) funnel-type preferential flow paths could be deterministically simulated if soil layering structure, hydraulic conductivity of the overall profile, and threshold potential of the embedded coarse layers were known; (ii) distribution of the vertical component of flux was determined by the funneling effect along the upper coarse sand lenses. The lenses located in deeper parts of the profile would only influence macrotortuosity of the

preferential flow paths; (iii) funnel-type preferential flow paths were determined not only by soil structures and textures but also by water application rate; and (iv) although funnel-type preferential paths were very complex, the vertical component of flux could be very simply described by two stochastic parameters-the mean and standard deviation of a log-normal distribution after the.

NAL Call No.: QH540.J6

143. Simulating nutrient uptake by single or competing and contrasting root systems.

Smethurst, P. J.; Comerford, N. B.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Sept/Oct 1993. v. 57 (5) p. 1361-1367.

Includes references.

Descriptors: nutrient-uptake; root-systems; interspecific-competition; simulation-models; computer-techniques; mathematical-models; solutes-; transport-processes

Abstract: Simulation of nutrient uptake by competing root systems is necessary to assist in the quantitative understanding of these processes, to predict the consequences of competition for nutrients, and to prioritize future research on the mechanisms of nutrient competition. Our objective was to apply previously published concepts to a computer model based on solute transport theory that would have the ability to simulate nutrient uptake by root systems of one or two competing plant species.

Analytical solutions were used for calculating the volume of soil allocated to each root system and the concentrations of solute at the root surfaces. We included in the model (i) a depletion zone that increased with time until it reached the no-transfer boundary, (ii) an adjustment of the average concentration in the depletion zone to account for newly encountered solute as the zone increased in radius, (iii) a variable root-absorbing power (α), and (iv) a routine to correctly account for all soil in simulations with two contrasting root systems. Predicted uptake for single-species scenarios in soils of contrasting nutrient supply characteristics was verified against that predicted by the commonly used Barber-Cushman model, NUTRIENT UPTAKE (maximum discrepancy was 23%), which utilizes a numerical solution. The ratio of uptakes predicted by both models was a function of root radius, effective-diffusion coefficient, and buffer power in a more complex way than previously suggested in the literature. Sensitivity analysis indicated that (i) relative to competing grass would be most sensitive to variations in root-length density of the grass, or in soil water content, if only soil parameters were examined.

NAL Call No.: 56.9-So3

144. Simulation by NCSWAP of seasonal nitrogen dynamics in corn. I. Soil nitrate.

Lengnick, L. L.; Fox, R. H.

Agron-j v.86, p.167-175. (1994).

Includes references.

Descriptors: zea-mays; computer-simulation; calibration-;
simulation-models; nitrogen-cycle; cycling-; carbon-;
soil-fertility; nitrates-; seasonal-variation; leaching-;
soil-water-movement; soil-structure; soil-morphological-features;
agricultural-soils; edaphic-factors; organic-fertilizers;
pennsylvania-; inorganic-fertilizers

Abstract: Computer simulation models of crop-soil systems offer the potential to increase understanding of soil N cycle processes, thereby improving management of N resources in agricultural systems. NCSWAP (Nitrogen, Carbon, Soil, Water, And Plant) is a comprehensive, deterministic computer model of the plant-soil system that simulates seasonal soil C and N cycles under the control of temperature, moisture, microbial activity, and crop growth. The objective of this study was to validate NCSWAP using data collected during a 3-yr N-rate study in central Pennsylvania that investigated seasonal N dynamics in corn (*Zea mays* L.) provided with N as liquid dairy manure or as NH_4NO_3 . Seasonal soil NO_3 concentration in the upper soil layer, seasonal aboveground N accumulation by corn, and water leached past 1.2 m during the second year of the study were used to calibrate input values controlling soil water flow and NO_3 production from mineralization of soil organic N sources. The validation of NCSWAP identified several limitations in the water flow and C and N cycling submodels as well as in the potential of the model to simulate seasonal N dynamics in corn. Validation simulations were about as accurate as calibration simulations, reflecting the ability of the model to simulate C and N dynamics without recalibration from year to year. Much of the simulation error was related to an overestimation of NO_3 leaching caused by the inability of the model's microporous flow submodel to simulate the macropore-influenced water flow in the well-structured soil used in the validation.

NAL Call No.: 4-AM34P

145. Simulation models, GIS and nonpoint--source pollution:
January 1991-December 1993.
Makuch, J.; Emmert, B.

Quick-bibliogr-ser. Beltsville, Md., National Agricultural
Library. Feb 1994. (94-06) 78 p.
Updates QB 92-69.

Descriptors: simulation-models; agricultural-chemicals;
water-quality; bibliographies-

NAL Call No.: aZ5071.N3

146. Simulation of bentazon leaching in sandy loam soil from
Mellby (Sweden) with the PESTLA model.
Boesten, J. J. T.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1231-1253.
(1994).

Special Issue on the Evaluation and Comparison of Pesticide
Leaching.

Descriptors: bentazone-; leaching-; sandy-loam-soils; soil-water;
water-flow; drainage-water; evapotranspiration-; sorption-;
pesticide-leaching-and-accumulation-model

NAL Call No.: TD172.J6

147. Simulation of dichlorprop and betazon leaching in soils of contrasting texture using the MACRO model.

Jarvis, N. J.; Stahli, M.; Bergstrom, L.; Johnsson, H.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1255-1277. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: dichlorprop-; bentazone-; leaching-; transport-processes; soil-water; water-flow; solutes-; soil-texture; macropore-flow; soil-water-balance

NAL Call No.: TD172.J6

148. Simulation of dichlorprop leaching in three texturally distinct soils using the pesticide leaching model.

Hall, D. G. M.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1211-1230. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: dichlorprop-; leaching-; simulation-models; macropores-; transport-processes; sandy-loam-soils; silty-soils; clay-soils; clay-loam-soils

NAL Call No.: TD172.J6

149. Simulation of simazine transport through soil columns using time-dependent sorption data measured under flow conditions.

Kookana, R. S.; Schuller, R. D.; Aylmore, L. A. G.

J-contam-hydrrol v.14, p.93-115. (1993).

Includes references.

Descriptors: soil-pollution; simazine-; transport-processes; sandy-soils; flow-; sorption-; simulation-models

NAL Call No.: TD426.J68

150. Simulation of the movement of bentazon in soils using the CALF and PRZM models.

Nicholls, P. H.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1157-1166. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: bentazone-; leaching-; simulation-models; pesticide-residues; flow-; leachates-; estimation-

NAL Call No.: TD172.J6

151. Simulation of the water management system of a peach canning plant.

Mate, J. I.; Singh, R. P.

Comput-electron-agric v.9, p.301-317. (1993).

Includes references.

Descriptors: water-use-efficiency; recycling-; peaches-; canning-; water-management; simulation-models; water-systems;

structural-design; water-flow; water-conservation;
mathematical-models; computer-software; water-quality;
water-reuse; extendtm-computer-software

NAL Call No.: S494.5.D3C652

152. Soil conservation in Cuba: a key to the new model for
agriculture.

Gersper, P. L.; Rodriguez Barbosa, C. S.; Orlando, L. F.

Agric-human-values v.10, p.16-23. (1993).

In the special issue: Low-input sustainable agriculture in Cuba /
edited by J.A. Carney.

Descriptors: low-input-agriculture; sustainability-;
soil-conservation; soil-fertility; tillage-; fertilizers-;
nitrogen-fixing-bacteria; green-manures; rotations-;
intercropping-; vermicomposting-; agricultural-wastes;
recycling-; animal-production; cuba-

NAL Call No.: HT401.A36

153. Soil conservation planning at the watershed level using the
Universal Soil Loss Equation with GIS and microcomputer
technologies: a case study.

Mellerowica, K. T.; Rees, H. W.; Chow, T. L.; Ghanem, I.

J-soil-water-conserv v.49, p.194-200. (1994).

Includes references.

Descriptors: agricultural-land; watersheds-; water-erosion;
risk-; universal-soil-loss-equation;
geographical-information-systems; mapping-; computer-techniques;
soil-conservation; erosion-control; regional-planning;
land-resources; new-brunswick

NAL Call No.: 56.8-J822

154. Soil moisture and runoff simulations using four catchment
rainfall-runoff models.

Hughes, D. A.

J-hydrol v.158, p.381-404. (1994).

Includes references.

Descriptors: soil-water; runoff-; rain-; soil-depth; watersheds-;
grasslands-; catchment-hydrology; deterministic-models;
variation-; accuracy-

Abstract: Four deterministic rainfall-runoff models are briefly
described and applied to a small (0.18 km²) grassland catchment
in the Eastern Cape Province of South Africa. The models vary in
complexity, from a variable time step model with two soil layers
and incorporating probability distribution principles for some of
the parameters, through two daily time step models, to a
relatively simple, but widely used, monthly time step model. The
model parameters have largely been determined from measured
physical characteristics (topography, soils, vegetation, etc.) of
the catchment and not through calibration. As well as comparing
the simulated runoff values, the model performances are compared
using observed values of soil moisture measured over a period of
some 29 months. Although the four models produce similar results,
the variable time step model simulates the observed soil moisture
variation most successfully and the monthly model least

successfully. Most of the differences in the simulation results can be explained by either the differences in complexity of the modelling approach or the resolution of the input data.

NAL Call No.: 292.8-J82

155. Soil nitrate leaching potential indices: using a simulation model as a screening system.

Khakural, B. R.; Robert, P. C.

J-environ-qual v.22, p.839-845. (1993).

Includes references.

Descriptors: nitrate-nitrogen; leaching-; losses-from-soil; simulation-models; groundwater-pollution; minnesota-

Abstract: Simulation models LEACHM-N (Leaching Estimation and Chemistry Model) and NLEAP (Nitrate Leaching and Economic Analysis Package) were first tested using NO₃ leaching data obtained from lysimeter and tile drainage studies conducted at three University of Minnesota experiment stations. Both simulation models did well in simulating total (seasonally accumulated) leaching loss of NO₃-N from the soil profile. LEACHM-N was selected as a screening tool to develop soil NO₃ leaching potential (NLP) ratings using soil survey information and representative county weather station data. Simulated growing season total NO₃-N leached from the soil profile (below 1.5 m) were used as NLP index. Crop management practices and initial N were kept constant. Soil NO₃ leaching potential ratings for three Minnesota counties, Redwood, Stearns, and Sherburne were developed using this method. This soil NLP rating information was included in the Soil Survey Information System (SSIS) to create leaching potential rating maps, which can be used to plan best N management schemes.

NAL Call No.: QH540.J6

156. A solute transport model for the acid leaching of copper in soil columns.

Montero, J. P.; Munoz, J. F.; Abeliuk, R.; Vauclin, M.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. May/June 1994. v. 58 (3) p. 678-686.

Includes references.

Descriptors: solutes-; transport-processes; movement-in-soil; copper-; leaching-; acid-treatment; sulfuric-acid; convection-; dispersion-; mass-transfer; mathematical-models; mining-; technology-; solution-mining-technology

Abstract: Modeling solution mining technique has recently received much attention in order to estimate metal recovery rates. We studied the acid leaching of Cu minerals found in mine tailings using a mathematical transport model and tab-scale experiments on both batches and saturated soil columns. The model is a one-dimensional macroscopic solute transport model that considers simultaneously (i) the convection, dispersion, and consumption of H₂SO₄, and (ii) the convection, dispersion, solubilization, and adsorption-desorption of Cu. Time-dependent batch experiments were carried out to understand the relationship between H₂SO₄ consumption and Cu extraction in tailing Cu materials under stagnant conditions. Additionally, miscible-displacement experiments were conducted to obtain

empirical data on Cu recovery in saturated soil columns that receive a constant pulse of H₂SO₄ and were designed to check the model's capability to simulate the transport phenomena. This was done by estimating the model parameters independently from the batch experiments. Since some findings from both experiments were consistent with each other, modeling assumptions, such as a second-order kinetic relationship for Cu dissolution (by H₂SO₄) and a first-order equilibrium isotherm for Cu, were appropriate in order to simulate the Cu recovery concentration at the outlet of each column. Finally, model equations were solved using finite differences and analytical solutions for Cu and H₂SO₄ transport equations, respectively, and model parameters were estimated using least squares techniques.

NAL Call No.: 56.9-So3

157. Spatial and qualitative reasoning for modeling physical processes.

View, L.; Martin Clouaire, R.

AI-appl v.8, p.61-74. (1994).

Includes references.

Descriptors: erosion-; simulation-; models-; watersheds-; rain-; runoff-water

NAL Call No.: QA76.76.E95A5

158. Statistical water quality modelling for urban runoff control planning.

Li, J. Y.; Adams, B. J.

Water-sci-technol v.29, p.181-190. (1994).

Selected Proceedings of the 6th International Conference on Urban Storm Drainage, September 12-17, 1993, Niagara Falls, Canada / edited by J.C. Marsalek and H.C. Torno.

Descriptors: runoff-water; water-quality; urban-areas; probabilistic-models; simulation-models; urban-planning

NAL Call No.: TD420.A1P7

159. Streamlines for diffusive flow in vertical and surface tillage: a model study.

Kirkham, M. B.

Soil-Sci-Soc-Am-j. [Madison, Wis.] Soil Science Society of America. Jan/Feb 1994. v. 58 (1) p. 85-93.

Includes references.

Descriptors: soil-air; air-flow; flow-to-roots; oxygen-; diffusion-; transport-processes; horizontal-flow; mathematical-models; chiselling-; vertical-flow; vertically-tilled; horizontally-tilled

Abstract: Methods of tillage must permit adequate flow of O₂ to plant roots. The objective of this work is to calculate streamlines of O₂ flow from chisel holes oriented vertically and horizontally (surface tillage) in the soil to plant roots. Streamlines are perpendicular to equipotential lines. They also have the property that the difference in value between two streamlines gives the quantity of fluid (in this case, O₂) flowing between them. Therefore, streamlines are often more important than equipotentials. Streamlines for flow of O₂ from

the chisel holes in the soil to plant roots were calculated by use of the relaxation method, in which both a coarse grid (2.54 cm on a side) and a fine grid (1.27 cm on a side) were used. Transit times were calculated from the flownet resulting from the streamlines and equipotential lines. Calculations with the coarse grid showed that, for the vertical chisel case, 75% of the flow goes out of the side of the chisel opening closest to the sheet of plant roots and 25% of the flow goes out of the side of the chisel opening farthest away from the sheet of plant roots; for the fine grid, the values are 63 and 37% for the two sides of the chisel hole, respectively. For both the vertically and horizontally tilled cases, stagnant areas were identified in the soil. Transit times were short for both tillage cases (on the order of minutes), confirming the general assumption that diffusion is the major mechanism of gas transport in soil.

NAL Call No.: 56.9-So3

160. Sweet corn response to combined effects of saline water and nitrogen fertilization.

Beltrao, J.; Asher, J. B.; Magnusson, D.

Acta-hortic p.53-58. (1993).

Paper presented at the International Symposium on Irrigation of Horticultural Crops, November 23-27, 1992, Almeria, Spain.

Descriptors: zea-mays; sweetcorn-; irrigation-; saline-water; nitrogen-fertilizers; crop-yield; dynamic-models; simulation-models; salts-; leaching-; wilting-point; israel-

NAL Call No.: 80-Ac82

161. Tennessee's NPS cost-share funds available for ag.

Water-prot-conserv-manage v.6, p.2. (1993).

Descriptors: water-quality; water-pollution; pollution-control; funds-; tennessee-

NAL Call No.: TD424.35.T2W37

162. Toxicity and estimated water quality criteria values in mallard ducklings exposed to pentachlorophenol.

Nebeker, A. V.; Griffis, W. L.; Schuytema, G. S.

Arch-environ-contam-toxicol. New York, Springer-Verlag. Jan 1994. v. 26 (1) p. 33-36.

Includes references.

Descriptors: pentachlorophenol-; feeding-; anas-platyrrhynchos; toxicity-; tissues-; concentration-; water-pollution; threshold-models; bioaccumulation-

NAL Call No.: TD172.A7

163. Translocation of alpha-sarcin across the lipid bilayer of asolectin vesicles.

Onaderra, M.; Mancheno, J. M.; Gasset, M.; Lacadena, J.; Schiavo, G.; Martinez del Pozo, A.; Gavilanes, J. G.

Biochem-j v.295, p.221-225. (1993).

Includes references.

Descriptors: aspergillus-; proteins-; mycotoxins-; liposomes-; membranes-; models-; transport-processes; glycine-max

Abstract: alpha-Sarcin is a cytotoxic protein produced by the

mould *Aspergillus giganteus*. Insertion of alpha-sarcin into asolectin membranes has been demonstrated by protein labelling with photoreactive phospholipids. alpha-Sarcin added externally to tRNA-containing asolectin liposomes degrades the entrapped tRNA. Trypsin-containing asolectin liposomes were also prepared. Encapsulated trypsin degrades alpha-sarcin, even in the presence of a large excess of external hen egg-white trypsin inhibitor to prevent any alpha-sarcin degradation outside the vesicles. These processes occur only with acidic phospholipids and were not observed when phosphatidylcholine vesicles were used. These results indicate that alpha-sarcin penetrates the lipid bilayer and becomes exposed to the lumen of negatively charged liposomes.
NAL Call No.: QP501.B64

164. Two-dimensional transport model for variably saturated porous media with major ion chemistry.
Simunek, J.; Suarez, D. L.

Water-resour-res v.30, p.1115-1133. (1994).
Includes references.

Descriptors: porous-media; transport-processes; models-; transient-flow; two-dimensional-flow; solutes-; ions-; soil-chemistry; subsurface-irrigation; surface-irrigation
Abstract: We present the development and demonstrate the use of the two-dimensional finite element code UNSATCHEM-2D for modeling major ion equilibrium and kinetic nonequilibrium chemistry in variably saturated porous media. The model is intended for prediction of major ion chemistry and water and solute fluxes for soils under transient conditions. Since the solution chemistry in the unsaturated zone is significantly influenced by variations in water content, temperature, and CO₂ concentrations in the soil gas, all these variables are also calculated by the model. The major variables of the chemical system are Ca, Mg, Na, K, SO₄, Cl, NO₃, alkalinity, and CO₂. The model accounts for equilibrium chemical reactions between these components such as complexation, cation exchange, and precipitation-dissolution. For the precipitation-dissolution of calcite and dissolution of dolomite, either equilibrium or multicomponent kinetic expressions are used which include both forward and back reactions. Other dissolution-precipitation reactions considered include gypsum, hydromagnesite, and nesquehonite. Since the ionic strength of soil solutions can often reach high values, both modified Debye-Huckel and Pitzer expressions were incorporated into the model to calculate single ion activities. The need for an iterative coupling procedure between the solute transport and chemical modules is demonstrated with an example which considers root water uptake and irrigation using moderately saline water. The utility of the model is further illustrated with two-dimensional simulations with surface and subsurface irrigation from a line source.

NAL Call No.: 292.8-W295

165. Uncalibrated performance of the finite element storm hydrograph model.
Hession, W. C.; Shanholtz, V. O.; Mostaghimi, S.; Dilaha, T. A.

Trans-ASAE v.37, p.777-783. (1994).

Includes references.

Descriptors: erosion-; runoff-water; simulation-models;
hydrological-data

Abstract: The capability of the Finite Element Storm Hydrograph Model (FESHM) to simulate runoff events in an ungaged context was evaluated using data from an experimental watershed. The FESHM was used to simulate 30 runoff events over a 17-year period of record. The results from these simulations were evaluated using various statistical analyses. Regression methodology then was used to assess expected error and model bias. Runoff volumes were simulated more closely than peak flows. The model simulated runoff volume adequately for site-specific and screening analysis, but peak flow estimates were adequate only for screening purposes. The relationship of predicted to observed peak flows was found to be linear with low peaks being underpredicted and higher peak flows overpredicted. Although the runoff volume regression line was close to the desired equal value line, scatter or variance was great and no linear relationship was evident. Peak flow and volume simulation errors were related to rainfall intensity. These simulation biases are likely due to a combination of inadequate representation of the infiltration process by the model and inappropriate input parameters. A resolution of these biases and corrective action was beyond the scope of this study. However, a starting point is provided for future model investigations or modifications. Finally, it appears that some form of calibration is needed to use the FESHM with confidence.

NAL Call No.: 290.9-Am32T

166. Urban storm drainage : selected proceedings of the 6th International Conference on Urban Storm Drainage, held in Niagara Falls, Canada, 12-17 September 1993. 1st ed.
Marsalek, J. I.; Torno, H. C.; International Conference on Urban Storm Drainage (6th : 1993 : Niagara Falls, C.

Oxford ; New York : Pergamon Press, 1994. x, 465 p. : ill., maps.
"Organized by International Association on Water Quality (IWAQ) [and] International Association on Hydraulics Research (IAHR)"--P. facing t.p.

Descriptors: Urban-runoff-Mathematical-models-Congresses;
Storm-sewers-Congresses; Drainage-Congresses;
Water-quality-management-Congresses

NAL Call No.: TD420.A1P7--v.29-no.1-2

167. Use of a rainfall-runoff model for simulating effects of forest management on streamflow in the east fork Lobster Creek Basin, Oregon. Use of a rainfall runoff model for simulating effects of forest management on streamflow.
Nakama, L. Y.; Risley, J. C.; Geological Survey (U.S.).

Portland, Or. : U.S. Geological Survey ; Denver, CO : Earth Science Information Center, Open-File Reports Section [distributor], 1993. iv, 40 p. : ill., maps.
Shipping list.: 93-653-P.

Descriptors: Rain-and-rainfall-Oregon-Mathematical-models;
Streamflow-Oregon-Mathematical-models

NAL Call No.: GB701.W375--no.93-4040

168. Use of GIS to rank counties for potential groundwater pollution.

Smith, P. A.; Scott, H. D.

Ark-farm-res v.42, p.4-5. (1993).

Includes references.

Descriptors: information-systems; groundwater-; groundwater-pollution; monitoring-; probabilistic-models; pesticides-; prediction-; arkansas-; geographic-information-systems

NAL Call No.: 100-Ar42F

169. The use of pesticide leaching models in a regulatory setting: an industrial perspective.

Russell, M. H.; Layton, R. J.; Tillotson, P. M.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1105-1116. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: pesticides-; leaching-; simulation-models; registration-; regulatory-issues

NAL Call No.: TD172.J6

170. Use of simulation models for registration purposes: evaluation of pesticide leaching to groundwater in the Netherlands.

Brouwer, W. W. M.

J-environ-sci-health,-Part-A,-Environ-sci-eng v.A29, p.1117-1132. (1994).

Special Issue on the Evaluation and Comparison of Pesticide Leaching.

Descriptors: pesticide-residues; leaching-; groundwater-pollution; netherlands-

NAL Call No.: TD172.J6

171. Use of the EPIC model to predict runoff transport of surface-applied inorganic fertilizer and poultry manure constituents.

Edwards, D. R.; Benson, V. W.; Williams, J. R.; Daniel, T. C.; Lemunyon, J.; Gilbert, R. G.

Trans-ASAE v.37, p.403-409. (1994).

Includes references.

Descriptors: pastures-; fertilizers-; poultry-manure; runoff-; simulation-models; water-quality; arkansas-; erosion-productivity-impact-calculator

Abstract: The Erosion Productivity Impact Calculator (EPIC) model was applied to four fields established in "tall" fescue (Festuca arundinacea Schreb.) in northwestern Arkansas to predict runoff and transport of nitrogen, phosphorus, and sediment. Fertilizer form varied among the fields with two receiving inorganic fertilizer, one receiving poultry (Gallus domesticus) litter, and one receiving poultry manure. Soil and grazing parameters also differed among fields. Runoff and nutrient/sediment transport

observed over 20 months were compared to EPIC predictions generated without calibration. Significant correlation between event predictions and observations were found in half the cases. There was significant correlation between observed and predicted calendar year total transport for all outputs except nitrate-nitrogen. The findings indicate that EPIC can accurately reflect runoff quality trends when executed without calibration for pasture fields in northwestern Arkansas.

NAL Call No.: 290.9-Am32T

172. Use of the gleams model to estimate pesticide overland and subsurface transport in USDA Forest Service nursery applications. Craig, J. P.; Weiss, R. C.

Water-sci-technol v.28, p.425-429. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: surface-water; water-systems; water-pollution; pesticides-; concentration-; usda-; forest-nurseries; drainage-water; models-; mississippi-; idaho-; michigan-; california-;

groundwater-loading-effects-of-agricultural-management-systems

NAL Call No.: TD420.A1P7

173. Using GLEAMS to evaluate the agricultural waste application rule-based decision support (AWARDS) computer program. Ford, D. A.; Kruzic, A. P.; Doneker, R. L.

Water-sci-technol v.28, p.625-634. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: agricultural-wastes; application-to-land; computer-software; pollutants-; loads-; water-pollution; simulation-models; groundwater-pollution; surface-water; groundwater-loading-effects-of-agricultural-management-systems; artificial-intelligence

NAL Call No.: TD420.A1P7

174. Using the CREAMS pesticides transfer sub-model at a rainfall simulation scale. Gouy, V.; Belamie, R.

Water-sci-technol v.28, p.679-683. (1993).

Paper presented at the IAWQ First International Conference on "Diffuse (Nonpoint) Pollution: Sources, Prevention, Impact, Abatement." September 19-24, 1993, Chicago, Illinois.

Descriptors: runoff-water; water-pollution; pesticides-; rainfall-simulators; concentration-; prediction-; models-

NAL Call No.: TD420.A1P7

175. Validation of AGNPS for small watersheds using an integrated AGNPS/GIS system. Mitchell, J. K.; Engel, B. A.; Srinivasan, R.; Wang, S. S. Y.

Water-resour-bull v.29, p.833-842. (1993).

Includes references.

Descriptors: watersheds-; pollution-; runoff-; sediment-;
erosion-; catchment-hydrology; simulation-models;
geographical-information-systems; integrated-systems;
topography-; illinois-; agricultural-nonpoint-source

Abstract: The AGNPS (Agricultural NonPoint Source) model was evaluated for predicting runoff and sediment delivery from small watersheds of mild topography. Fifty sediment yield events were monitored from two watersheds and five nested subwatersheds in East Central Illinois throughout the growing season of four years. Half of these events were used to calibrate parameters in the AGNPS model. Average calibrated parameters were used as input for the remaining events to obtain runoff and sediment yield data. These data were used to evaluate the suitability of the AGNPS model for predicting runoff and sediment yield from small, mild-sloped watersheds. An integrated AGNPS/GIS necessary to this study. This system is one where the AGNPS model was integrated with the GRASS (Geographic Resources Analysis Support System) GIS (Geographical Information System) to develop a decision support tool to assist with management of runoff and erosion from agricultural watersheds. The running the model, and interpretation of the results.

NAL Call No.: 292.9-Am34

176. Water pollution II : modelling, measuring, and prediction.
Brescia, C. A.; Wrobel, L. C. L. C. 1.; International Conference
on Water Pollution: Modelling, M. a. P. 2. 1. M. I.

Southampton ; Boston : Computational Mechanics Publications,
c1993. 739 p. : ill..

"Contains the proceedings of the Second International Conference
on Water Pollution held in June 1993, Milan, Italy"--P. [4] of
cover.

Descriptors: Water-Pollution-Congresses;
Water-Pollution-Mathematical-models-Congresses;
Water-Pollution-Measurement-Congresses; Water-quality-Congresses;
Sewage-Purification-Congresses

NAL Call No.: TD419.5.W365--1993

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