SOIL AND WATER CONSERVATION IS ESSENTIAL FOR ECOSYSTEM MANAGEMENT TONY PRATO pdf

1: List of conservation organisations - Wikipedia

In recent times, a relatively new metaphor has been used to usher in a new philosophy of resource conservation and management, called ecosystem management (EM). I would like to describe this metaphor and its implications for soil and water conservation.

Climate change has already affected our wilderness. Climate change is known to affect ecosystems. The problem is amplified by changes to the landscape. What have we learned so far about how climate change is affecting our global environment? Studies show that it adversely affects human and natural systems by reducing biodiversity impairing biological and chemical cycles making it more difficult to restore degraded ecosystems Climate is not the only factor in the deterioration of natural systems. We are making big changes to the landscape, altering land use and land cover in major ways. These changes combined present a challenge to environmental management. Adaptive management is a scientific approach to managing the adverse impacts of climate and landscape change. Nature and impacts of climate change Every week it seems there is an article about global warming in the news media. It may be difficult for some to grasp the big picture of the issue, but in general, climate change has already or is expected to increase temperatures, particularly in the interior of continents, toward the poles and in winter boost precipitation in wetter areas and suppress precipitation in drier areas Climate change is affecting weather and temperature. Global average temperature has increased by about 0. Warming is the result, in part, of rapid increases in emissions of greenhouse gases GHG , particularly carbon dioxide CO2 , which is a byproduct of the combustion of fossil fuels, such as coal, oil, and natural gas, used for power generation and transportation. When global temperatures rise and precipitation patterns change, it is expected there will be consequences on ecosystems, such as an increase in the spread of exotic species; redistribution of plants, animals, energy, water, and nutrients; alteration of natural processes and the structure and function of ecosystems. The Arctic is warming faster than the rest of the world. Northerly latitudes are particularly vulnerable to climate change. The Arctic Council, an intergovernmental forum for Arctic nations and indigenous people, reported that the northern ice cap is warming at twice the global rate and the Arctic region is expected to warm at two to three times the rate for the rest of the world. Arctic warming will have serious human and ecological consequences. Nature and impacts of landscape change Both nature and humans contribute to landscape change. Landscape change results from natural disturbances and human activities. Natural disturbances include fire, windstorms, avalanches, landslides, tree fall, floods, and insect epidemics. Human activities causing landscape change include urban sprawl, conversion of forestland to agriculture, drainage of wetlands, and forest fragmentation from road construction and timber harvesting. Humans have a big impact on landscapes. Human activities often have a more significant effect on landscapes than natural disturbances because they alter the availability of energy, water, and nutrients to ecosystems; increase the spread of exotic species; accelerate natural processes of ecosystem change; and adversely affect the structure and functioning of ecosystems. Human-induced landscape change has accelerated during the past several decades because of rapid population and economic growth, particularly in countries such as China, India, and Brazil. Most of the contiguous United States has been altered since its settlement. Landscape change has contributed to a dramatic 1,fold increase in species extinction over the past years. On a global basis, nearly 1. During the last three centuries, 12 million km2 of cropland were lost. Between and , , km2 of non-federal land were urbanized in the United States. More than 90 percent of the land in the lower 48 states has been logged, plowed, mined, grazed, paved, or otherwise modified from presettlement conditions. Development in parts of the Yellowstone ecosystem has increased fourfold. Human-induced landscape change significantly affects wildlife. For example, between and , rural residential development in the Montana and Wyoming portions of the Greater Yellowstone Ecosystem increased percent. Consequently, current and potential grizzly bear habitat on private lands in the ecosystem has been degraded and fragmented. Double-digit growth in residential subdivisions adjacent to the National

Elk Refuge in Jackson, Wyoming, has diminished winter range for the 10, elk that use the refuge and displaced corridors that elk use to reach summer range in Yellowstone and Grand Teton National Parks. Another example of significant impacts from landscape change is the Crown of the Continent Ecosystem. Here are some specifics: Most old-growth forests on unprotected lands in the Rockies are gone. Most old growth forests that once existed outside of protected park and wilderness areas have been harvested. Many rivers in the region have been altered by hydroelectric power development. Significant farm, ranch, and forest acreage has been converted to homes and commercial developments. Lakes and streams have been polluted by agricultural and urban runoff. Fish and wildlife habitats have been degraded. Active and proposed energy developments threaten protected areas. Large areas have been invaded by nonnative species. The desire to preserve the outstanding wildlife especially large carnivores and environmental amenities from the negative effects of rapid economic growth and development in the northern Rocky Mountain region prompted creation of the Yellowstone to Yukon Conservation Initiative. The initiative involves conservation organizations and covers an area larger than the states of California and Texas combined, including the Greater Yellowstone and Crown of the Continent Ecosystems. Coping with climate and landscape change Although climate and landscape change has positive effects on human and natural systems, it is expected to have many adverse impacts that deserve attention. Ecosystems have an inherent capacity to resist climate and landscape change, known as ecological resilience. When this capacity is exceeded, the ecosystem can change in ways that may not be socially and ecologically acceptable. There are ways to help ecosystems adjust to the changes. So what can be done? Mitigation strategies can reduce ecosystem vulnerability, and adaptation strategies can increase ecological resilience to climate and landscape change. Adaptation strategies are actions to counteract the adverse consequences of climate and landscape change. Natural resource managers can use both strategies to reduce adverse ecosystem effects of climate and landscape change. The Kyoto Protocol to the United Nations Framework Convention on Climate Change, which took effect in February , is a prime example of a climate change mitigation strategy. Current concentrations are about ppm. Benefits of the Kyoto Protocol may be limited because it does not include some developed countries, which emit substantial GHGs, and developing countries where rapid population and economic growth is expected to dramatically increase GHG emissions. The Kyoto Protocol is a mitigation strategy to slow climate change. Other mitigation strategies include increasing the use of alternative energy sources and technologies clean coal, renewable energy, ethanol, hybrid vehicles, and nuclear power. Although the United States did not sign the Kyoto Protocol, 28 states have programs to curb CO2 emissions, and at least US cities have agreed to apply the Kyoto emission reduction standards to their communities. Other initiatives, like the Apollo Alliance, bring together labor unions, environmental and business groups, and activist organizations with the mission of sharply reducing US dependence on fossil fuels. The alliance is seeking ways to do the following: These funds would be raised using tax incentives, public bonds, capital strategies, and other mechanisms. Communities, too, can adapt. The Inuvialuit people of Sachs Harbor in the Canadian Arctic illustrate an example of social adaptation to climate change. They adapted by changing both the species they hunted and the timing and methods of hunting. Other adaptation strategies for climate change include: Communities can devise their own solutions. For example, greater use of irrigation in crop production could reduce the amount of water available for other human uses and natural systems. Several strategies are suitable for mitigating adverse effects of natural landscape change. It is a dominant natural driver of landscape change and is likely to increase with global warming. Wildfire can be mitigated by reducing fuel loads in the urban-wildland interface and extinguishing wildfires that threaten human life and property. Because wildfire has positive ecological benefits, extinguishing all wildfires is not appropriate. As it is unacceptable to some at least in democratic societies to control population and economic growthâ€"the primary drivers of landscape changeâ€"options for mitigating human-induced landscape change are limited. However, we can take these steps: There are ways to limit human impacts. Adaptation strategies can help protect vulnerable species and their habitat. For example, restricting development in buffer zones for protected areas would reduce the amount of land available for development, but it would increase conservation of protected areas and maintain open spaces. The adaptive management approach Resource management faces many challenges. The writing is on the wall: Resource managers must implement effective mitigation and adaptation strategies well in advance of expected impacts of climate and landscape change. This task is challenging for two reasons: First, most natural resource managers do not have the personnel and budget to manage their areas for potentially adverse impacts of climate and landscape change. Second, there is considerable uncertainty regarding the nature and extent of future climate and landscape change, and how natural and human systems are likely to respond to those changes, with or without mitigation and adaptation strategies. Adaptive management AM is a science- and information-based approach that is well suited for managing natural resources for climate and landscape change. It does the following: AM is a scientific approach to managing natural resources. AM has been employed in Canada and the United States. Passive AM formulates predictive models of ecosystem responses to management actions, makes management decisions based on those models, and revises the models using monitoring data. Passive AM is relatively simple and inexpensive, but it does not yield reliable information about ecosystem responses to management actions due to statistical deficiencies. Active AM overcomes these deficiencies by employing experimental data to test hypotheses about the effects of management actions, such as mitigation and adaptation strategies. However, AM is challenging to apply because it AM may be challenging to implement. Decision support tool Natural resource managers are unlikely to use the AM approach to manage adverse impacts of climate and landscape change unless the approach is made understandable and accessible. This can be achieved by incorporating the approach in an Internet-based decision support tool that integrates the following elements for specific management areas: Managers have tools available to try AM. A pilot program to evaluate the pros and cons of the proposed AM approach to managing adverse impacts of climate and landscape change would provide valuable information. It would develop and evaluate the AM approach and decision support tool for a sample of managed ecosystems that encompasses a range of natural resource and environmental conditions, human uses and values, and availabilities of scientific information and technical expertise. Results of the pilot program could be used to identify conditions under which the approach is most likely to be feasible that is, when expected benefits exceed expected costs.

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2: College of Agriculture, Food, and Natural Resources // Stephen H. Anderson, Ph.D.

Relationship with the Land includes a collection of the most though-provoking articles that have appeared in the Journal of Soil and Water Conservation in the last 60 years. Questions Have a question about this item?

Soil properties evaluated with X-ray tomography include macropore and mesopore size distributions and characteristics, pore continuity, and pore tortuosityâ€”all critically important for transport of water, air and solutes in soil systems. Fractal and fuzzy logic techniques are applied to quantify pore-scale variability of biopores. Effects of cover crop and biofuel crop management on computed tomography-measured pore parameters. The centennial of the first erosion plots. In situ infiltration as influenced by cover crop and tillage management. Imidacloprid sorption and transport in cropland, grass buffer and riparian buffer soils. Vadose Zone Journal Improved APEX model simulation of buffer water quality benefits at field scale. Effects on soil physical properties related to soil erodibility. Soil thermal properties influenced by perennial biofuel and cover crop management. Vegetative buffer strips for reducing herbicide transport in runoff: Journal of American Water Resources Association Soil water infiltration affected by topsoil thickness in row crop and switchgrass production systems. Analysis of CT-measured pore characteristics of porous media relative to physical properties. Influence of agroforestry buffers on soil hydraulic properties relative to row crop management. Soil hydraulic properties as influenced by prairie restoration. Synchrotron microtomographic quantification of geometrical soil pore characteristics affected by compaction. Published by European Geosciences Union. Soil physical and hydraulic properties affected by topsoil thickness in cultivated switchgrass and corn-soybean cropping systems. Quantifying and modeling urban stream temperature: A central US watershed study. Assessment of selected methods for estimating chemical transport parameters from computed tomographic imaging. Tomography-measured spatial distributions of non-aqueous phase liquids in porous media. Long-term agro-ecosystem research in the central Mississippi River Basin: Journal of Environmental Quality Long-term agro-ecosystem research in the Central Mississippi River Basin: Introduction, establishment, and overview. Indaziflam effect on Bermudagrass Cynodon dactylon L. Soil Science Society of America Journal Computed tomography-estimated transport velocity and chemical dispersivity in undisturbed geomedia. Tomography-measured macropore parameters to estimate hydraulic properties of porous media. Diesel oil volatilization processes affected by selected porous media. Use of fuzzy rainfall-runoff predictions for claypan watersheds with conservation buffers in Northeast Missouri. Journal of Hydrology Evaluation of a stepwise, multiobjective, multivariable parameter optimization method for the APEX model. Advances in tomography and imaging. Chemical transport in undisturbed soils estimated using transfer function models. Sulfamethazine sorption to soil: Vegetative management, pH, and dissolved organic matter effects. Sulfamethazine transport in agroforestry and cropland soils. Vadose Zone Journal 12 2: Assessment of rootzone mixes with inorganic and organic amendments for athletic fields. International Turfgrass Society Research Journal Agricultural Policy Environmental eXtender simulation of three adjacent row-crop watersheds in the claypan region. Influence of scale on chemical dispersivity in geomedia. Water infiltration influenced by agroforestry and grass buffers for a grazed pasture system. Using APEX to develop and validate physically-based indices for the delineation of critical management areas. Journal of Soil and Water Conservation Soil quality indicator responses to row crop, grazed pasture, and agroforestry buffer management. Analysis of three-dimensional geometrical pore parameters from rock weathering. Claypan and its environmental effects. Pollutant transport in geomedia using X-ray computed tomography. APEX model simulation of runoff and sediment losses for grazed pasture watersheds with agroforestry buffers. Polyacrylamide efficacy for reducing soil erosion and runoff as influenced by slope. Determination of representative elementary areas for soil redoximorphic features identified by digital image processing. Agroforestry and grass buffer effects on soil quality parameters for grazed pasture and row-crop systems. Applied Soil Ecology Calibration of a water content reflectometer and soil water dynamics for an agroforestry practice. Veterinary antibiotic sorption to agroforestry buffer, grass buffer and cropland soils. Compaction effects on soil macropore geometry and related parameters for an arable field. Root length density and carbon content of agroforestry and grass buffers under grazed pasture systems in a Hapludalf. Agroforestry and grass buffer influences on macropores measured by computed tomography under grazed pasture systems. Polyacrylamide and gypsum amendments for erosion and runoff control on two soil series. Effects of long-term soil and crop management on soil hydraulic properties for claypan soils. APEX model assessment of variable landscapes on runoff and dissolved herbicides. Identification and quantification of soil redoximorphic features by digital image processing.

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3: Soil and water conservation is essential for ecosystem management

Tony Prato Viewpoint: Soil and water conservation is essential for ecosystem management Journal of Soil and Water Conservation 54 (3): - Excerpt.

Achieving sustainable ecosystem management is especially challenging in Flathead County, Montana due to its heavy economic dependence on activities that compete for land and water resources, such as production of agricultural and forest products, nature-based tourism, outdoor recreation and conservation of biodiversity. A major goal of the project is to enhance the capacity of stakeholders planners, resource managers, citizens and policy makers to evaluate the ecological economic impacts of past and future landscape change in Flathead County and to manage landscapes in a sustainable manner. This will be accomplished by integrating geo-spatial analytical techniques remote sensing, GIS and GPS , landscape ecology, ecological economic models and spatial decision support systems. The project has four objectives: Project Methods Objective 1. A three-step procedure will be used to identify ecological impacts of historical changes in land cover. The first step creates land cover maps for the county and two river corridors for , and by applying supervised maximum likelihood, artificial neural network and a knowledge-based classifier to Landsat TM images. The second step delineates protection, resource management and development zones for the county. The third step quantifies historical changes in land cover between and and and using a post classification algorithm, which are used to estimate transition probabilities. The latter will be used in simulating future changes in land cover see objective 2. Land cover change will be modeled in two stages. The first stage estimates changes in land cover in management zones and the second stage allocates those changes within a zone. Three different schemes will be used to spatially allocate land cover changes to specific pixels cells within each management zone. Economic impacts will be assessed by entering the scenario-based changes in final demands in and specified for a development scenario in the IMPLAN model for Flathead County and running the model to determine the changes in total economic output, household income, and employment. Ecological impacts and associated changes in land cover from future development in Flathead County will be assessed using an ecological model that operates at the county and river corridor scale. The river corridor selected for assessment is the main stem of the Flathead River between Columbia Falls and Kalispell. Ecological impacts of future land cover changes at the county scale will be assessed by applying FRAGSTATS and Simmap to simulated land cover maps for and developed in objective 2. Ecological changes in the river corridor will be assessed by applying a hydrogeomorphic model of functional assessment of wetlands to simulated land cover changes in the river corridor for and An Internet-based SDSS will be developed that allows stakeholders to identify ecological impacts of past changes in land cover and assess ecological economic impacts of future development and evaluate the effectiveness of alternative conservation strategies in alleviating adverse ecological impacts of future development in Flathead County. A variety of server and client software technologies will be used to create the Web-based interfaces for the landscape, economic and ecological and policy models, wherein the client user makes a request to the server and the server gives the results back to the client. On the client side, various web languages will be used to create user interfaces for the models that will make them highly accessible to users having no special knowledge of modeling. The project was completed in The year was spent writing publications for peer-reviewed journals on various aspects of the project. In addition, final results have been included on the project website. A workshop was held with stakeholders to describe and discuss the results of the project and how they can be used in community planning activities and in implementing the new long-run growth policy for Flathead County. The most significant outputs of the project are: The target audience includes other researchers at universities and government agencies, planning and natural resource managers in the study area, and the residents of Flathead County, Montana. There were no major changes in the project. Another outcome is a spatial decision support tool, which is on the project website http: Another outcome was a workshop held in the county in which stakeholders learned more about the nature and results of the project. The Crown of the Continent: Striving for ecosystem sustainability. Evaluating land use policies under uncertainty. Land Use Policy Evaluating alternative futures for Flathead County, Montana. Landscape and Urban Planning Economic growth and landscape change. Sustaining Rocky Mountain Landscapes: Second, further refinements were made to a land use change model for simulating land use changes i. Third, economic growth rates specified in the alternative futures were used in the IMPLAN model to estimate changes in total output and employment for industries and associated increased demands for residential housing and commercial units in Flathead County from to and to Fourth, attributes describing the suitability of undeveloped land parcels for residential and commercial development were quantified. Sixth, previously collected hyperspectral imagery was georectified and aggregated mosaic into a single image used for land cover classification based on vegetation types and human disturbance that could be characterized by reflectance signature. A combination of supervised and unsupervised classifications was used to produce a land cover map for the reach. Mean spectral signatures were calculated for each cover type and subsequently used in a supervised classification. For the entire river reach, a final land cover map was produced consisting of dominant cover types i. Impacts Results are too preliminary to assess social, economic and environmental impacts. Results are expected to help planners, developers, and other stakeholders evaluate such impacts for alternative futures. The Montana Department of Environmental Quality has expressed interest in using the results of the project for a water resource assessment they are doing in the region. A fuzzy logic approach to ecosystem sustainability. Accounting for uncertainty in making species protection decisions. Modeling ecological impacts of landscape change. Bayesian adaptive management of ecosystems.

4: ActionBioscience - promoting bioscience literacy

Request PDF on ResearchGate | On May 1, , T. Prato and others published Adaptive ecosystem management For full functionality of ResearchGate it is necessary to enable JavaScript.

Soil erosion and water quality Encyclopedia Article The relationship between water quality and soil erosion cannot be overemphasized. Soil erosion and residue management, especially surface water runoff, influence water quality. A tillage survey sponsored by the Iowa Resource Management Partnership committee indicated the need for improvement in adopting conservation practices. The survey shows no increase in conservation tillage no-till for the period Residue management is a critical component in controlling soil erosion. Conservation tillage, residue management, and cultural management play a significant role in increasing the efficiency of nutrient management practices and erosion control. To ensure reliable and profitable yield, producers apply herbicides, pesticides, fertilizers, amendments, or manure. Most of these materials attach to soil particles, where they function as intended. However, some of these contaminates are likely to be transported with soil particles and sediment when soil erodes, thereby affecting water quality. Therefore, controlling erosion is the crucial link in any plan to improve water quality. It is critical to manage soil erosion to protect water quality and to meet criteria set by total maximum daily load TMDL allocations for 91 of impaired water bodies that have been affected by sediment in Iowa, where soil erosion control and residue management become a priority. TMDLs were originally designed to regulate point source pollution, such as discharge from factories, into rivers and lakes. Now, concerns over water quality problems have been traced to agriculture, and the EPA is considering using its authority under the Clean Water Act of to set TMDLs for non-point source pollution. TMDLs could be used to set guidelines for nitrogen, phosphorus, and sediment flow into water bodies. TMDLs could change the way producers use land and control erosion. Tillage and manure and nutrient management would all have to be linked, and monitoring could be used to identify and solve problems. The P Index is an assessment tool with three major components: The P Index was not designed to be a regulatory tool; instead, it is a procedure to identify sources of potential P movement and to determine when management practices are needed to decrease the probability of P loss. There will also be opportunities to learn more about TMDLs, nutrient criteria, animal feeding operations, and source water protection. This article originally appeared on page 22 of the IC 2 -- February 26, issue.

5: Soil Chemistry & Fertility | www.enganchecubano.com

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6: Research | ANU Fenner School of Environment & Society

A LWRMS is a spatial pattern of land uses, soil/water conservation methods, and nutrient/chemical management practices for a property or catchment. Multiple-criteria decision analysis (MCDA) provides a suitable conceptual framework for evaluating landowner selection of LWRMS.

7: List of environmental books - Wikipedia

healthy plant and soil ecosystem supplies a path for the water to move and filter deeper into the soil. As the water moves through the soil, it is purified and cleansed by natural soil processes.

8: Soil erosion and water quality | Integrated Crop Management

In light of the ecosystem stresses caused by climate and land use changes, ecosystem managers face the dual challenges of selecting and implementing efficient projects (i.e., management actions) to reduce future losses in ecosystem services, and ensuring that implemented projects are reducing losses in ecosystem services.

9: Friends of Wake SWCD | Friends of Wake Soil and Water Conservation District

Soil properties evaluated with X-ray tomography include macropore and mesopore size distributions and characteristics, pore continuity, and pore tortuosity-all critically important for transport of water, air and solutes in soil systems.

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