

Bibliography on long term studies related to organisms and materials in general, also to agriculture and GM crops, Klaus Ammann 2007, from Web of Science and other sources

(2003). "Royal society wants long-term monitoring of GM impact." Outlook on Agriculture **32**(3): 200-201.<Go to ISI>://000186229400017

Aas, W. and A. Semb (2001). "Standardisation of methods for long-term monitoring." Water Air and Soil Pollution **130**(1-4): 1595-1600.<Go to ISI>://000172012000114

A monitoring programme should be designed for duration. This means that methods should not only be appropriate with respect to detection limits and accuracy, but they should also be as simple as possible and they should be documented in such a way that measurements will be comparable over many decades. In this connection, it is particularly important to understand that results are dependent on methods, instruments and procedures. Within the European monitoring network (EMEP) there are several different sampling procedures for the main air components, SO₂, NO₂, SO₄²⁻, NO₃⁻ + HNO₃, and co-located experiments have therefore been initiated to quantify the difference between the measurements. Reference methods and reference instruments corresponding to the recommendation in the EMEP Manual have been run together with the usual measurements at EMEP sites in several countries. The results are generally satisfactory, especially in the case where identical methods are used. However, there are also some unacceptable differences, e.g. when comparing NO₂ and SO₂ monitors with the reference methods. The monitors do have a main advantage of providing easily accessible data with short time resolution; nevertheless, the accuracy at low concentrations is usually poor. The traditional reference methods need development and simplification in the direction of the more appealing automatic instruments.

Agee, J. K. (2003). "Monitoring postfire tree mortality in mixed-conifer forests of Crater Lake, Oregon, USA." Natural Areas Journal **23**(2): 114-120.<Go to ISI>://000182267800003

Tree mortality after a prescribed fire was monitored four times in 13 years in a mixed-conifer forest at Crater Lake, Oregon, USA. Immediate postfire mortality was concentrated in smaller size classes for all species. Mortality of larger and older trees continued, with a peak for *Pinus ponderosa* Dougl. and *Pinus lambertiana* Dougl. in the 3-7 y period following fire, and a peak for *Abies concolor* (Gord. & Glend.) Lindl in the 8- 13 y period. Monitoring mortality over long time periods showed that the burn objectives were achieved most closely immediately after the fire, but were compromised by subsequent mortality of large and older trees. This delayed mortality was probably linked to extended drought that also killed large trees in adjacent unburned areas. Further fuel reduction burns might reduce tree density below historic levels unless fires remain patchy. Melding structure and process goals will be essential for achieving resources management objectives in dry forests managed for natural values.

Alcock, R. E., A. E. Johnston, S. P. McGrath, M. L. Berrow and K. C. Jones (1993). "Long-Term Changes in the Polychlorinated Biphenyl Content of United-Kingdom Soils." Environmental Science & Technology **27**(9): 1918-1923.<Go to ISI>://A1993LW24900033

Archived soils collected from five different long-term agricultural experiments in southern England have been analyzed retrospectively for a range of polychlorinated biphenyl (PCB) congeners. The change in soil PCB concentration over time has been similar in each field experiment, namely, that soil samples exhibited a sharp rise in soil PCB concentrations between about 1940 and the early 1960s, reaching a maximum (ca. 140-560 mug of SIGMAPCB/kg of soil) during the late 1960s/early 1970s. Since then there has been a dramatic reduction in SIGMAPCB concentrations, such that contemporary concentrations (ca. 20-30 mug/kg) are now similar to those of the early 1940s soils. If these soil loadings were reflected nationwide, the SIGMAPCB burden of U.K. soils has fallen from ca. 26 600 t in 1970 to a contemporary burden of ca. 1500 t. This is equivalent to an annually averaged net loss of approximately 14 mug SIGMAPCB m⁻² day⁻¹, but a slower approximately 1 mug SIGMAPCB m⁻² day⁻¹ in recent years. Volatilization and subsequent long-range transport probably account for the bulk of this loss. A total of 67 000 t of PCBs was manufactured in the United Kingdom between 1954 and 1977, with an estimated 40 000 t used within the United Kingdom. There has been a gradual shift in the relative proportion of individual congeners since the peak, with a move toward greater proportions of the heavier homologue groups in the most recent samples.

Alcock, R. E., K. C. Jones, M. S. McLachlan and A. E. Johnston (1999). "Response to comment on "Evidence for the presence of PCDD/Fs in the environment prior to 1900 and further studies on their temporal trends"." Environmental Science & Technology **33**(1): 206-207.<Go to ISI>://000077954100051

Alcock, R. E., M. S. McLachlan, A. E. Johnston and K. C. Jones (1998). "Evidence for the presence of PCDD/Fs in the environment prior to 1900 and further studies on their temporal trends." Environmental Science & Technology **32**(11): 1580-1587.<Go to ISI>://000074032700023

This paper presents evidence for the existence of PCDD/Fs in the environment prior to the widespread development of the chloroaromatics and chlorine industry, by the analysis of a previously unopened bottle of soil collected in 1881 from a controlled long-term agricultural experiment at Rothamsted Experimental Station. Great care was taken to avoid contamination of the sample from dust or by exposure to modern air; an experiment was conducted to investigate the potential for contamination of the sample by such exposure. The 1881 soil sample (from the plowed 0-23 cm depth layer) contained 0.7 ng of Sigma TEQ/kg soil, and there were no detectable changes in its Sigma PCDD/F composition when aliquots of it were exposed over 32 days in a laboratory at Lancaster University. Modern soil sampled from the same field plot (which has never received any fertilizers or amendments) now contains 1.4 ng of Sigma TEQ/kg, an increase resulting from cumulative atmospheric deposition of PCDD/Fs retained in the surface layers of the soil. Post-collection contamination issues were also addressed by PCDD/F analysis of dust and paper bags used to store more recent samples. The Sigma TEQ concentration of archived herbage samples collected year-on-year from Rothamsted between 1980 and 1995 have trended downward by a factor of 3-4, implying a recent decline in the atmospheric deposition of

PCDD/Fs and supporting a previously reported (Kjeller et al. Environ. Sci. Technol. 1996, 31, 458-463) longer term decline. The significance of these results is discussed.

Archibold, O. W. and E. A. Ripley (2004). "Assessment of seasonal change in a young aspen (*Populus tremuloides* Michx.) canopy using digital imagery." *Applied Geography* **24**(1): 77-95. <Go to ISI>://000188087500005

Direct and indirect measurements of leaf area distribution during the 2001-growing season were used to characterize the structure of a small aspen grove in relict grassland of the northern Great Plains. Located in the Kernen Prairie near Saskatoon, the 1.5 ha grove had last been burned in October 1986. Measurements included solar radiation inside and outside the grove; digital hemispheric images of the tree canopy taken bi-weekly, and mean areas of individual leaves at three canopy heights. The images were processed using Idrisi (R) digital image processing software designed for geographical information system (GIS) applications. 2 Leaf size averaged near 5 cm, varying little through the summer, although larger leaves were proportionally more abundant in the upper canopy early in the growing season. Hemispherical cover increased rapidly in early May from about 40% (no leaves) to about 80% (fully leafed), dropping back to the earlier value after leaf fall in late September and early October. Solar radiation under the canopy dropped from 55% of ambient before the first leaves appeared to 25% during most of the summer, increasing to near 50% by late October. Calculated plant (leaf plus stem) area indices increased from about 0.4 in the leafless phase to near 1.7 during the full-leaf stage in late June. Digital imagery analysis provided a rapid assessment of canopy structure. This may be useful for long-term monitoring of stand responses to different management techniques. (C) 2003 Elsevier Ltd. All rights reserved.

Asch, R. G. and D. D. Turgeon (2003). "Detection of gaps in the spatial coverage of coral reef monitoring projects in the US Caribbean and Gulf of Mexico." *Revista De Biologia Tropical* **51**: 127-140. <Go to ISI>://000185198100016

As part of the US Coral Reef Task Force's National Program to Map, Assess, Inventory, and Monitor US Coral Reef Ecosystems, a comprehensive survey of projects/programs monitoring coral reef ecosystems and related habitats (i.e., seagrass beds and mangroves) in the US Caribbean and Pacific was undertaken. Information was gathered on a total of 296 monitoring and assessment projects conducted since 1990 in the US Caribbean and the Gulf of Mexico. Substantial gaps in monitoring coverage of US coral reef ecosystems were revealed through geographic information system (GIS) analysis of survey metadata. Although southern Florida contains approximately two-thirds of all marine monitoring projects found in the US Caribbean and Gulf of Mexico, we were unable to identify any ongoing projects that monitor coral reefs along Florida's western coast and off of the Florida Middle Grounds. Additionally, Florida is covered by approximately 1 900 km² of mangroves, yet there were only four ongoing projects that monitor this ecosystem, leaving gaps in coverage in the Lower and Middle Keys and along the eastern and western coasts. The Flower Garden Banks National Marine Sanctuary, located offshore of the Texas/Louisiana border, has an integral long-term monitoring program, but lacks a monitoring project that gathers long-term, quantitative data on reef fish abundance and certain water quality parameters. Numerous coral reef monitoring projects in Puerto Rico arc concentrated on the island's southwestern coast surrounding La Parguera, while far fewer monitoring projects are conducted along the northern and southeastern coasts and around Vieques Island. In the US Virgin Islands, the paucity of monitoring projects in large areas of St. Croix and St. Thomas contrasts with monitoring activity in three marine protected areas (MPAs), where 66% of the US Virgin Islands' coral reef monitoring sites were found. Only a series of assessments have been conducted at Navassa, a small, uninhabited island located 55 km west of Haiti and 137 km northeast of Jamaica. In order to better understand changes in coral reef communities and to produce a series of biennial reports on the status of US coral reef ecosystems, the National Oceanic and Atmospheric Administration (NOAA) is developing a national coral reef monitoring network. This network has already begun to fill some of these gaps in monitoring coverage through issuing cooperative grants to states and territories to build long-term monitoring capacity.

Aziz, J. J., M. Ling, H. S. Rifai, C. J. Newell and J. R. Gonzales (2003). "MAROS: A decision support system for optimizing monitoring plans." *Ground Water* **41**(3): 355-367. <Go to ISI>://000182672600014

The The Monitoring and Remediation Optimization System (MAROS), a decision-support software, was developed to assist in formulating cost-effective ground water long-term monitoring plans. MAROS optimizes an existing ground water monitoring program using both temporal and spatial data analyses to determine the general monitoring system category and the locations and frequency of sampling for future compliance monitoring at the site. The objective of the MAROS optimization is to minimize monitoring locations in the sampling network and reduce sampling frequency without significant loss of information, ensuring adequate future characterization of the contaminant plume. The interpretive trend analysis approach recommends the general monitoring system category for a site based on plume stability and site-specific hydrogeologic information. Plume stability is characterized using primary lines of evidence (i.e., Mann-Kendall analysis and linear regression analysis) based on concentration trends, and secondary lines of evidence based on modeling results and empirical data. The sampling optimization approach, consisting of a two-dimensional spatial sampling reduction method (Delaunay method) and a temporal sampling analysis method (Modified CES method), provides detailed sampling location and frequency results. The Delaunay method is designed to identify and eliminate redundant sampling locations without causing significant information loss in characterizing the plume. The Modified CES method determines the optimal sampling frequency for a sampling location based on the direction, magnitude, and uncertainty in its concentration trend. MAROS addresses a variety of ground water contaminants (fuels, solvents, and metals), allows import of various data formats, and is designed for continual modification of long-term monitoring plans as the plume or site conditions change over time.

Baker, C. J., D. P. Roberts, N. M. Mock and V. L. Blount (2004). "A novel open-system technique to monitor real-time oxygen consumption during early phases of seed germination." *Seed Science Research* **14**(1): 17-26. <Go to ISI>://000220975400002

A novel technique allows long-term monitoring of real-time oxygen consumption during seed germination in an open system. Most current techniques used to detect oxygen consumption by seeds measure the decrease in oxygen concentration in a closed chamber. This is not ideal for long-term experiments because the chamber must be replenished with air periodically, subjecting the seeds to abrupt changes in oxygen concentration. The current technique employs an open system, in which seeds are submerged in a continuously aerated aqueous environment. Oxygen electrodes are used to measure the steady-state concentration of oxygen in the solution, which is a function of both the rate of oxygen

consumption by the seed and the rate of aeration from the atmosphere. The rate of aeration is directly dependent on the oxygen concentration of the bathing solution; therefore, previous calibration of the system allows the direct conversion of steady-state oxygen concentrations into oxygen consumption rates. Because oxygen is not limiting, the experimental design described here can monitor the same sample non-intrusively every minute for more than 24 h, allowing for greater precision than hourly readings often reported with current techniques. Multiple treatments and/or replicates can be run simultaneously, allowing sensitive comparison of various seed treatments or seed types. To illustrate its potential application, the technique was used to follow the rehydration and pre-emergence phases of germination of cucumber (*Cucumis sativum*), pea (*Pisum sativum*) and mustard (*Brassica juncea*) seeds, detect the inhibitory effects of surface sterilization techniques on seed respiration of cucumber, and follow the interaction of a bacterial biocontrol agent with germinating cucumber and pea seeds.

Beck, A. J., G. L. Harris, K. R. Howse, A. E. Johnston and K. C. Jones (1995). "Effect of Crop Residue Management and Drainage on the Persistence and Movement of Isoproturon in a Structured Clay Soil over the Growing-Season of a Winter Barley Crop." *Journal of Agricultural and Food Chemistry* **43**(5): 1368-1376. <Go to ISI>://A1995QY97800045

The persistence of isoproturon [3-(4-isopropylphenyl)-1,1-dimethylurea] in the cultivated horizon and losses from mole drains in a structured clay soil sown with winter barley and managed by crop residue burning and ash incorporation were compared with those where the crop residues were chopped and plowed in. Desorption coefficients (X_{app}) increased over time as isoproturon concentration declined and were greater on the burnt plot than on the unburnt plot on every sampling occasion. By contrast, sorption coefficients (K_d) were more consistent at approximately 5.0 L/kg on both plots. The variability of sorption and desorption was sensitive to temporal variation of rainfall. Sorption nonideality was observed on every sampling occasion with the nonideality index (K_d/K_{app}), declining with time following isoproturon application. Twenty-seven days following the autumn pre-emergent herbicide application [2.475 kg of active ingredient (ai) on October 9, 1991] K_d/K_{app} was approximately 0.5 and after 97 days had fallen to approximately 0.2, where it stabilized until the post-emergent application (1.625 kg of ai/ha on May 4, 1992) three months later. The variability of all parameters was almost as great at the local scale as at the field scale. Total isoproturon losses in drainflow over the growing season were similar at 869 and 943 mg/ha for the burnt plot and unburnt plot, respectively. However, temporal variation in leaching losses was complex, being influenced by a number of factors including dilution effects, soil solution contact times, and possibly particle-assisted transport.

Bennett, L. P. and R. J. Milne (2004). "Criteria to assess and select sites for long-term avian monitoring in an urbanizing landscape." *Environmental Monitoring and Assessment* **94**(1-3): 147-162. <Go to ISI>://000189078400011

A methodology was developed to prioritize the suitability of sites for long-term monitoring of avian populations, including vulnerable species, both to enhance assessment of changes in ecological resources and to facilitate land-use planning at the regional scale. This paper argues that a successful monitoring program begins with a site prioritization procedure that integrates scores based on spatial controls with ecological and socio-economic indicators, particularly those dependent on community involvement. The evaluation strategy in this study combines 1) spatial controls such as land ownership and accessibility, with 2) biological and habitat indicators such as vulnerable species and habitat connectivity, and 3) community and agency variables such as volunteer commitment and agency priorities. In total, a set of ten indicators was identified. This strategy was applied to predominantly agricultural landscapes, which are experiencing increasing human pressures, in three sub-watersheds of the Credit River, Southern Ontario. Specifically, bird populations were recorded during the breeding seasons of 2000-2002 in nine land units or habitat types including marsh, deciduous forest, and grasslands as mapped by Credit Valley Conservation (CVC) following Ecological Land Classification (ELC) guidelines. CVC selected sites for long-term monitoring in 2002 and the relationships between the scored (or ranked) sites and the selected long-term monitoring sites are discussed.

Bennun, L. A. (2001). "Long-term monitoring and the conservation of tropical wetlands: high ideals and harsh realities." *Hydrobiologia* **458**: 9-19. <Go to ISI>://000173248500003

Long-term monitoring of wetlands is an essential element of management for 'wise use'. Indeed, the Ramsar Convention requires regular monitoring in order to detect changes in ecological character at listed sites. However, there are few examples of successful long-term monitoring in tropical wetlands. Monitoring schemes run into three kinds of difficulties: Conceptual, logistical and political. To be effective, monitoring schemes must be carefully planned and designed. In practice, the questions to be addressed are rarely made explicit. Strictly defined, monitoring should assess deviations from a pre-set level so that appropriate corrective action can be taken. This assumes that good baseline information exists, and that we have sufficient knowledge of the system to set sensible signal levels. Neither is usually the case in tropical wetlands. This means that carefully focused surveillance (a time-series of systematic observations) is an essential first step. Providing resources and co-ordination for surveillance or monitoring is challenging over the long term, especially if the variables being measured require expensive analyses and highly trained staff. I suggest that surveillance or monitoring programmes should focus on likely threat..., and ecological or economic concerns, should be as simple, robust and inexpensive as possible, should be sustained and consistent, and should involve local people and volunteers. If it is to be effective, monitoring must have a clear linkage to wetland management. Ideally, it should form part of each country's wetland policy. I suggest some variables that could be incorporated in sustainable long-term monitoring programmes. Two examples of successful surveillance, work at Kenyan wetlands illustrate (that the challenges involved in long-term programmes can, at least in part, be overcome).

Beswick, K. M., T. W. Choularton, D. W. F. Inglis, A. J. Dore and D. Fowler (2003). "Influences on long-term trends in ion concentration and deposition at Holme Moss." *Atmospheric Environment* **37**(14): 1927-1940. <Go to ISI>://000182301700007

Long-term monitoring of rain and cloud water has been carried out at a high level site within the urban plume downwind of Manchester in north-west England. Samples have been taken weekly at Holme Moss. The site experiences significant orographic cloud cover, resulting in enhancement of rainfall volume via the seeder-feeder process. Samples are analysed for major ions, with the results being interpreted in the light of the effects of the seeder-feeder enhancement and reductions in UK emissions of pollutants. Rainfall volume enhancement is dependent on the spatial and temporal extent of orographic cloud at the site, with resultant consequences on ionic strength in the samples. Large rainfall amounts are

associated with longer cloud duration and lower cloud base. Rain passing through the cloud scavenges proportionately more larger droplets, resulting in relatively lower ionic concentration. Coupled with increased washout upwind, this limits the amount of deposition, with some ions showing a decrease in deposition at high rainfall amounts. Clear downward trends are seen in sulphate concentration in rain and cloud water, with both emissions reduction and the dilution effect of increasing rainfall being responsible. Less significant downward trends are observed for nitrate, although this is in line with national patterns of deposition. Deposition at Holme Moss for all ions is dominated by the prevailing, predominantly maritime, southwesterly airflow, although for non-marine ions there are significant contributions from the industrial areas of Yorkshire to the east, and to a lesser extent the Birmingham conurbation to the south. (C) 2003 Elsevier Science Ltd. All rights reserved.

Blanchard, P., M. Festa-Bianchet, J. M. Gaillard and J. T. Jorgenson (2003). "A test of long-term fecal nitrogen monitoring to evaluate nutritional status in bighorn sheep." *Journal of Wildlife Management* **67**(3): 477-484. <Go to ISI>://000184297500003

We analyzed 23 years of monitoring data from a bighorn sheep (*Ovis canadensis*) population to determine whether fecal nitrogen (FN), expected to reflect diet quality, can be used to track population nutritional status over the long term. We considered 3 measures of FN: its maximum value each spring (FN peak), the date of the peak, and the area under the curve relating Julian date to summer FN (FN-total). We first determined the sources of variation in these 3 measures. Population density had a strong negative effect on FN-total while summer precipitation was positively related to FN-total, suggesting that diet quality declined with increasing density and improved with precipitation. Most sheep were recaptured every year, allowing us to assess FN as an indicator of nutritional condition by examining the relationships between summer mass gain and both FN peak and FN-total. The value of FN peak was not related to summer mass gain for any sex-age class, but FN-total was positively related to Summer mass gain of nonlactating females and yearling females. Our results suggest that FN can be used as an index of forage quality over several years. Over several years, FN also reflects aspects of bighorn sheep body growth and is correlated with changes in density that may ultimately affect population performance. Short-term monitoring of FN, however, may not provide much useful information.

Bogdanov, S., V. Kilchenmann, K. Seiler, H. Pfeifferli, T. Frey, B. Roux, P. Wenk and J. Noser (2004). "Residues of para-dichlorobenzene in honey and beeswax." *Journal of Apicultural Research* **43**(1): 14-16. <Go to ISI>://000221055500003

Para-dichlorobenzene (PDCB) is an insecticide used in beekeeping for wax moth control. Analysis of PDCB residues were carried out on Swiss retail market honey samples by the cantonal food control authorities in 1997, 1998, 2000, 2001 and 2002. 173 Swiss honeys and 287 imported samples were analysed. On average, 30% of the Swiss honeys contained PDCB, 13% of them being above the Swiss tolerance value of 10 µg/kg. On the other hand, only 7% of the imported honeys were contaminated. The minimum values were 2 µg/kg, the maximum ones 112 µg/kg. Long-term monitoring of Swiss beeswax, carried out from 1993 to 2000, showed that most of the comb foundation beeswax produced in Switzerland is contaminated by PDCB with values ranging from one to 60 mg/kg. The results show that the reason for this contamination is the use of PDCB for the control of wax moth. These residues can be avoided as wax moth can be controlled successfully with alternative methods, carried out according to good apicultural practice.

Borken, W. and E. Matzner (2004). "Nitrate leaching in forest soils: an analysis of long-term monitoring sites in Germany." *Journal of Plant Nutrition and Soil Science-Zeitschrift Fur Pflanzenernahrung Und Bodenkunde* **167**(3): 277-283. <Go to ISI>://000222121200004

Elevated atmospheric inputs of NH_4^+ and NO_3^- have caused N saturation of many forest ecosystems in Central Europe, but the fate of deposited N that is not bounded by trees remains largely unknown. It is expected that an increase of NO_3^- leaching from forest soils may harm the quality of groundwater in many regions. The objective of this study was to analyze the input and output of NH_4^+ and NO_3^- at 57 sites with mature forest stands in Germany. These long-term study sites are part of the European Level 11 program and comprise 17 beech, 14 spruce, 17 pine, and 9 oak stands. The chloride balance method was used to calculate seepage fluxes and inorganic N leaching below the rooting zone for the period from 1996 to 2001. Nitrogen input by throughfall was significantly different among most forest types, and was in the order: spruce > beech/oak > pine. These differences can be largely explained by the amount of precipitation and, thus, it mirrors the regional and climatic distribution of these forest types in Germany. Mean long-term N output with seepage was log-normal distributed, and ranged between 0 and 26.5 kg N ha⁻¹ yr⁻¹, whereby 29 % of the sites released more than 5 kg N ha⁻¹ yr⁻¹. Leaching of inorganic N was only significantly lower in the pine stands ($P < 0.05$) compared with leaching rates of the spruce stands. Median N output : input ratio ranged between 0.04 and 0.11 for the beech, oak, and pine stands, while the input : output ratio of the spruce stands was 0.24, suggesting a higher risk of NO_3^- leaching in spruce forests. Following log-transformation of the data, N input explained 38 % of the variance in N output. The stratification of the data by the C : N ratio of the O horizon or the top mineral soil revealed that forests soils with a C : N ratio < 25 released significantly more NO_3^- (median of 4.6 kg N ha⁻¹ yr⁻¹) than forests with a C : N ratio > 25 (median of 0.8 kg N ha⁻¹ yr⁻¹). The stratification improved the correlation between N input and N output for sites with C : N ratios < 25 ($r^2 = 0.47$) while the correlation for sites with C : N ratios > 25 was weaker ($r^2 = 0.21$) compared with the complete data set. Our results suggest that NO_3^- leaching may increase in soils with wide C : N ratios when IN deposition remains on a high level and that the potential to store inorganic N decreases with C : N ratios in the O horizons becoming more narrow.

Borsuk, M. E., C. A. Stow and K. H. Reckhow (2004). "A Bayesian network of eutrophication models for synthesis, prediction, and uncertainty analysis." *Ecological Modelling* **173**(2-3): 219-239. <Go to ISI>://000220480700006

A Bayesian network consists of a graphical structure and a probabilistic description of the relationships among variables in a system. The graphical structure explicitly represents cause-and-effect assumptions that allow a complex causal chain linking actions to outcomes to be factored into an articulated series of conditional relationships. Each of these relationships can then be independently quantified using a submodel suitable for the type and scale of information available. This approach is particularly useful for ecological modelling because predictable patterns may emerge at a variety of scales, necessitating a multiplicity of model forms. As an example, we describe a Bayesian network integrating models of the various processes involved in eutrophication in the Neuse River estuary, North Carolina. These models were developed using a range of methods, including: process-based models statistically fit to long-term monitoring data, Bayesian hierarchical modelling of cross-system data gathered from the literature, multivariate regression modelling of mesocosm

experiments, and judgements elicited from scientific experts. The ability of the network to accommodate such a diversity of methods allowed for the prediction of policy-relevant ecosystem attributes not normally included in models of eutrophication. All of the submodels in the network include estimates of predictive uncertainty in the form of probability distributions which are propagated to model endpoints. Predictions expressed as probabilities give stakeholders and decision-makers a realistic appraisal of the chances of achieving desired outcomes under alternative nutrient management strategies. In general, the further down the causal chain a variable was, the greater the predictive uncertainty. This suggests that a compromise is necessary between policy relevance and predictive precision, and that, to select defensible environmental management strategies, public officials must adopt decision-making methods that deal explicitly with scientific uncertainty. (C) 2003 Elsevier B.V. All rights reserved.

Bouma, J. and M. J. D. Hacktenbroeke (1993). "Simulation Modeling as a Method to Study Land Qualities and Crop Productivity Related to Soil-Structure Differences." *Geoderma* **57**(1-2): 51-67. <Go to ISI>://A1993KY59300003

Research on soil biota under natural conditions in the field is complicated because large fluctuations in populations of certain species may occur as a result of natural or man-induced fluctuations in soil physical and chemical conditions. As a result, many experiments have therefore been made in the laboratory under controlled conditions. Though quite valuable, such data may be difficult to extrapolate to field conditions. To better relate biotic data to physical and chemical conditions in the field, expensive long-term monitoring programs can be initiated to collect both types of data. Physical, and chemical processes in soils can also be characterized by simulation techniques. Simulation requires one-time measurement of some basic and characteristic soil parameters, such as hydraulic conductivity and moisture retention, which are used in a model that calculates water contents in the soil at any given depth and time as a function of precipitation, evaporation and water table levels. Simulation modelling has been applied successfully to calculate water regimes in the soil, for periods of many years. The technique would appear to be particularly appropriate for use in a dynamic physical characterization of different types of soil structure, formed by various soil biota. Results are presented of a study in a sandy loam soil in the Netherlands with biogenic structures in grassland and a more compact physcogenic structure in arable land. Measured hydraulic conductivity and moisture retention data, and their variability were used in a simulation model to calculate important land qualities for a thirty year period. Land qualities were expressed in stochastic terms by focusing on the probability that certain water and associated air contents and trafficabilities would occur at any given data. Results also reflected the effects of variability of input data. Exploratory modelling was used in this study to estimate effects of an increase of the hydraulic conductivity (which might result from an increase of biological activity), on water and air contents in the soil during the year.

Bragg, D. C., M. G. Shelton and B. Zeide (2003). "Impacts and management implications of ice storms on forests in the southern United States." *Forest Ecology and Management* **186**(1-3): 99-123. <Go to ISI>://000186868100009

This review explores the ecological and silvicultural impacts of ice storms on forests in the southern United States. Different environmental factors like weather conditions, topography, vegetation, stand density, and management practices influence the degree of glaze damage a particular forest may experience. Additionally, the frequent contradictions in the relationships between these factors and the resulting damage suggests a complexity that makes each ice storm unique and difficult to predict. We recommend a series of silvicultural responses to ice storms, including density management, planting species selection, post-event evaluation, salvage, stand rehabilitation, and long-term monitoring of forest health. Published by Elsevier B.V.

Brookes, P. C., A. Gildon, P. W. Lane and A. E. Johnston (1979). "Effects of Different Watering Methods, Soil Weights, Soil Diluents and Soil Coverings on the Yield and Nutrient-Uptake by Ryegrass Grown in a Controlled Environment." *Journal of the Science of Food and Agriculture* **30**(5): 528-531. <Go to ISI>://A1979HB92300013

Burge, S. R. and R. G. Burge (2002). "Multiple-sensor, long-term monitoring system for environmental contaminants." *Abstracts of Papers of the American Chemical Society* **223**: 010-NUCL. <Go to ISI>://000176296800782

Bustos-Baez, S. and C. Frid (2003). "Using indicator species to assess the state of macrobenthic communities." *Hydrobiologia* **496**(1-3): 299-309. <Go to ISI>://000185919300028

Environmental impact assessments are often followed by the continuous monitoring needed to determine community change. This long-term monitoring can be time-consuming and expensive. The concept of indicator species attempts to use their presence in a sample or area to characterise a certain degree of community change or pollution effects. This approach has been widely applied to benthic monitoring studies. However, many studies develop their own list of 'indicators' in cases without having a prior knowledge of the area or any long-term data. This can result in the production of circular arguments. We carry out a meta-analysis on data sets from 5 of the 20 designated United Kingdom's sewage sludge dumping grounds and the data set from the classic study of Pearson & Rosenberg (1978). We construct a number of indices to examine this robustness across studies. Having refined our criteria for an 'indicator taxa' we examine the spatial and temporal changes in macrobenthic communities occurring at the Tyne sewage sludge dumpsite to examine the utility of this approach. Of the total pool of 123 taxa, 81 taxa responded in one study only. While *Spio filicornis* (O. F. Muller), *Spiophanes bombyx* (Claparede), *Lagis koreni* (Malmgren) and *Nephtys cirrosa* (Ehlers) showed directly contradictory patterns in different locations. The Spearman's rank correlation test showed a significant negative relationship between the density of macro-litter per station found at the Tyne dumping ground and the abundance of *Abra alba* (Wood) ($r(s) = 0.462$, $n = 6$, $P = 0.1$) and *Amphiura filiformis* (O. F. Muller) ($r(s) = 0.493$, $n = 6$, $P = 0.1$). These were the only indicator taxa, which showed a strong relationship to sewage contamination. We therefore conclude that while the concept of indicators may be widely applicable, the actual indicator taxa are not. This demonstrate that the used of indicators must be continually developed providing prior information of the study area.

Butt, K. R., C. N. Lowe, J. Frederickson and A. J. Moffat (2004). "The development of sustainable earthworm populations at Calvert landfill site, UK." *Land Degradation & Development* **15**(1): 27-36. <Go to ISI>://000189037000003

Earthworms *Allolobophora chlorotica* and *Aporrectodea longa* were inoculated into Calvert landfill site in spring 1992, in conjunction with the planting of two tree species *Alnus glutinosa* and *Acer pseudoplatanus*. Monitoring has taken place

over a period of 11 years. Sampling in 2003 revealed that earthworm distribution no longer equated to the inoculation treatments; the worms had spread extensively. The presence of *A. glutinosa* had a significant effect ($p < 0.001$) on earthworm number (mean density 198 m⁻²) and biomass (34 g m⁻²) compared to plots where *A. pseudoplatanus* had been planted and subsequently died (mean density 118 m⁻²; biomass 21 g m⁻²). Results suggest that tree presence may be critical to earthworm community development. In 2002, the spread of *A. chlorotica* from the original points of inoculation had reached 60 m with the highest recorded population density at 108 m⁻² with a mass of 18.6 g m⁻². *A. longa* was recorded at a distance of 132 m from the nearest point of inoculation with the highest recorded population density at 70 m⁻² with a mass of 49.3 g m⁻², 10 m from the original inoculation grid. Other species recorded (and % of total) were *Aporrectodea rosea* (0.9) *Lumbricus castaneus* (7.4), *Eiseniella tetraedra* (21.5) and *Lumbricus rubellus* (4.5). The two inoculated species, *A. chlorotica* (40.4) and *A. longa* (25.3), accounted for two thirds of the earthworms found on site. The highest earthworm community density was, 213 m⁻² with a mass of 73.9 g m⁻² at 10 m from original point of inoculation. In 1999, treatments of surface organic matter (OM), in the form of composted green waste, and rotavation were applied to non-replicated plots of 50 m² with the effects on earthworm distribution and abundance recorded in 2002. Addition of OM alone led to an increase in number and mass (331 m⁻²; 95 g m⁻²) compared to the control (233 m⁻²; 51 g m⁻²), while rotavation alone (111 m⁻²; 36 g m⁻²) had a detrimental effect over the given time period. This long-term monitoring programme has demonstrated the development of sustainable earthworm communities on a landfill site. Natural nutrient accumulation and addition of OM on or into the soil-forming material appeared to assist this process. This work may help to inform post-capping treatment at similar landfill sites. Copyright (C) 2004 John Wiley Sons, Ltd.

Butt, K. R., M. J. Shipitalo, P. J. Bohlen, W. M. Edwards and R. W. Parmelee (1999). "Long-term trends in earthworm populations of cropped experimental watersheds in Ohio, USA." *Pedobiologia* 43(6): 713-719. <Go to ISI>://000084831700033

Earthworm communities in 7 experimental watersheds at Coshocton, Ohio were monitored twice annually (Spring and Autumn) for 5 years (1990-94). Sampling by formalin extraction was undertaken along a transect running up slope within the small (0.5-0.7 ha) watersheds that were used for row crop production under a variety of tillage practices. Six earthworm species were found: *Aporrectodea turgida*, *A. trapezoides*, *Lumbricus rubellus*, and *Octolasion tyraeum* present in all watersheds, plus *A. tuberculata* and *L. terrestris* with restricted distributions. In individual watersheds, earthworm density was lowest at 3 m⁻² (Autumn 1991) and highest at 397 m⁻² (Spring 1994), with overall watershed averages fluctuating between 55 and 247 m⁻². Tillage practice and crop type did not have, a significant effect on earthworm numbers ($p > 0.05$). Equally, position along the transect was not significant for all watersheds, however, in some years (e. g. 1991) more worms were found towards the slope bottom. This suggested a link with rainfall but no significant correlations were found between recorded rainfall and earthworm numbers over the 5 year period. Additional sampling during Spring 1994 using a combination of formalin extraction and hand-sorting revealed that some populations may have been underestimated by 75 % (this difference mainly due to the smaller species), but overall no significant differences were recorded ($p > 0.05$) for biomass or density. The presence of deep burrowing species has a marked effect on rainfall infiltration. Therefore, attempts were made to establish *L. terrestris* in one watershed where it was previously absent. These proved unsuccessful, even though a number of techniques were used. This indicated that the distribution of earthworms within this system was not simply a factor of colonisation ability.

Carstensen, J., D. Conley and B. Muller-Karulis (2003). "Spatial and temporal resolution of carbon fluxes in a shallow coastal ecosystem, the Kattegat." *Marine Ecology-Progress Series* 252: 35-50. <Go to ISI>://000183325800003

Spatial and temporal variations in pelagic carbon fluxes were examined by means of a large-scale and long-term monitoring data set from the Kattegat, a shallow marginal sea impacted by man-induced eutrophication. Flows of carbon, nitrogen and phosphorus in the upper mixed layer (0 to 10 m) were estimated from a simple descriptive model using measurements of primary production, temperature, and phytoplankton/zooplankton biomass as input variables. For all years combined, annual primary production at coastal stations (171 g C m⁻² yr⁻¹; 8 stations) was almost twice that at the deeper open-water stations (105 g C m⁻² yr⁻¹; 5 stations), which resulted in an annual primary production of 116 g C m⁻² yr⁻¹ for the region as a whole during the entire study period (1989 to 1997). Interannual variation in primary production was substantially smaller than the between-station variation. The phytoplankton spring bloom contributed substantially to annual production (10 to 20 %), but the magnitude and timing were highly variable between years. Respiration accounted for on average 12 % of the measured primary production. Annual sedimentation was estimated at 55 g C m⁻² yr⁻¹, equivalent to 54 % of net primary production. The estimated new production was significantly related to nitrogen loading from the land and atmosphere, and a regression analysis predicted declines of between 20 and 47 % in annual net primary production from a 50 % reduction in nitrogen loading. Carbon and nutrient fluxes are consistent with those of earlier studies from the Kattegat based on small-scale and short-term data sets. However, combining monitoring data with a budget model greatly improved data resolution in both time and space. Estimated C/N/P fluxes from the model can act as reliable indicators for assessing the state of eutrophication in the Kattegat and other inland seas impacted by man-induced nutrient loading.

Castaldini, M., A. Turrini, C. Sbrana, A. Benedetti, M. Marchionni, S. Mocali, A. Fabiani, S. Landi, F. Santomassimo, B. Pietrangeli, M. P. Nuti, N. Miclaus and M. Giovannetti (2005). "Impact of Bt corn on rhizospheric and on beneficial mycorrhizal symbiosis and soil eubacterial communities in experimental microcosms." *Applied and Environmental Microbiology* 71(11): 6719-6729. <Go to ISI>://000233225000033

A polyphasic approach has been developed to gain knowledge of suitable key indicators for the evaluation of environmental impact of genetically modified Bt 11 and Bt 176 corn lines on soil ecosystems. We assessed the effects of Bt corn (which constitutively expresses the insecticidal toxin from *Bacillus thuringiensis*, encoded by the truncated Cry1Ab gene) and non-Bt corn plants and their residues on rhizospheric and bulk soil eubacterial communities by means of denaturing gradient gel electrophoresis analyses of 16S rRNA genes, on the nontarget mycorrhizal symbiont *Glomus mosseae*, and on soil respiration. Microcosm experiments showed differences in rhizospheric eubacterial communities associated with the three corn lines and a significantly lower level of mycorrhizal colonization in Bt 176 corn roots. In greenhouse experiments, differences between Bt and non-Bt corn plants were detected in rhizospheric eubacterial communities (both total and active), in culturable rhizospheric heterotrophic bacteria, and in mycorrhizal colonization. Plant

residues of transgenic plants, plowed under at harvest and kept mixed with soil for up to 4 months, affected soil respiration, bacterial communities, and mycorrhizal establishment by indigenous endophytes. The multimodal approach utilized in our work may be applied in long-term field studies aimed at monitoring the real hazard of genetically modified crops and their residues on nontarget soil microbial communities.

Chai, J. C. and N. Miura (2004). "Field vapor extraction test and long-term monitoring at a PCE contaminated site." Journal of Hazardous Materials **110**(1-3): 85-92.<Go to ISI>://000222315600009

The results of a field investigation, vapor extraction tests, and long-term monitoring at a PCE-contaminated site in Saga, Japan, are reported. The field investigation indicated that PCE likely was trapped in a surface clayey sand layer (vadose zone), and soil vapor extraction (SVE) was adopted as the remediation approach. The field test results the effectiveness of SVE in removing volatile organic compounds (VOCs) from contaminated sites. For the case where the radius of influence for an extraction well was 15-20 m, the blower capacity had no obvious effect on the radius of influence possibly due to the short circuiting of air from the ground surface. However, the maximum negative pressure (difference between vapor pressure and ambient pressure) in the extraction well was approximately proportional to blower capacity for the range of blower capacities tested. The long-term monitoring results indicate that PCE concentration varied seasonably, and temperature and rainfall are two of the influencing factors. (C) 2004 Elsevier B.V. All rights reserved.

Chan, K. Y., D. P. Heenan and H. B. So (2003). "Sequestration of carbon and changes in soil quality under conservation tillage on light-textured soils in Australia: a review." Australian Journal of Experimental Agriculture **43**(4): 325-334.<Go to ISI>://000182927000001

Light-textured soils (<35% clay) make up more than 80%, by area, of cropping soils in Australia. Many have inherent soil physical problems, e. g. hardsetting, sodicity and low organic carbon levels. Maintenance and improvement of soil organic carbon levels are crucial to preserving the soil structure and physical fertility of these soils. A review of field trials on conservation tillage (3-19 years duration) on these soils in southern Australia revealed that significantly higher soil organic carbon levels compared with conventional tillage were found only in the wetter areas (>500 mm) and the differences were restricted to the top 2.5-10.0 cm. The average magnitude of the difference was lower than that reported in the USA. The lack of a positive response to conservation tillage is probably a reflection of a number of factors, namely low crop yield (due to low rainfall), partial removal of stubble by grazing and the high decomposition rate (due to the high temperature). There is evidence suggesting that under continuous cropping in the drier areas, the soil organic carbon level continues to decline, even under conservation tillage. Better soil structure and soil physical properties, namely macro-porosity, aggregate stability and higher infiltration have been reported under conservation tillage when compared with conventional tillage. However, little information on long-term changes of these properties under conservation tillage is available. As many of these soil qualities are associated directly or indirectly with soil organic carbon levels, the lack of significant increase in the latter suggests that many of these improvements may not be sustainable in the longer term, particularly in the drier areas. Continuous monitoring of long-term changes in the soil organic carbon and soil quality under conservation tillage in different agro-ecological zones is needed.

Chapman, S. J., C. D. Campbell and G. Puri (2003). "Native woodland expansion: soil chemical and microbiological indicators of change." Soil Biology & Biochemistry **35**(6): 753-764.<Go to ISI>://000183610500003

The regeneration of native pine woodlands, a habitat of high biodiversity value, is being actively encouraged by conservation agencies as a positive future change in land use. A field study was carried out at Abernethy Forest, Scotland by sampling soil along three parallel transects running from open moorland, through an intermediate zone showing tree seedling colonization, into mature native pinewood forest with the aim of establishing a long-term monitoring site and providing baseline data. The specific objectives were to determine, first, which physical, chemical or microbiological properties in moorland soils would be affected by tree colonization and, secondly, what might be the implications of forest expansion on the soil carbon balance. Moving from moorland to forest, moisture and soil acidity decreased significantly and paralleled vegetation changes but there was little change in %C or %N. Microbial biomass, measured as the total carbon in the soil microflora, decreased markedly towards the forest while the metabolic quotient, a relative measure of microbial activity, showed a significant increase. None of the chemical or microbial indicators were able to detect changes due to seedling colonization at their present stage of development. However, microbial indicators appeared to be more sensitive than physico-chemical properties to the aboveground vegetation. Both the microbial biomass C and the metabolic quotient are likely to be good indicators of change as colonization develops. Estimation of the total sequestered soil carbon indicated more in the moorland (524 t C ha⁻¹) than in the forest (288 t C ha⁻¹), but this did not include the modest aboveground carbon stored in the tree biomass. At this particular site, forest expansion may result in some loss of soil C that would be partly offset by increases in aboveground C. (C) 2003 Elsevier Science Ltd. All rights reserved.

Choi, Y. D. (2004). "Theories for ecological restoration in changing environment: Toward 'futuristic' restoration." Ecological Research **19**(1): 75-81.<Go to ISI>://000188540600010

Ecological restoration is one of the fastest growing fields in applied ecology providing new ideas and opportunities for biological conservation and natural resource management. Despite countless attempts in the past, large portions of restoration projects have been considered unsuccessful mainly due to: unrealistic goals; inadequate restoration plans based on an ad-hoc approach; lack of explicit and quantified evaluation criteria for restoration success; lack of ecological understanding; social, economic, and political constraints; or combinations of these factors. Existing ecological theories, particularly succession theories, may provide a conceptual framework for a restoration trajectory. However, projecting a 'desirable' trajectory and outcome is often challenged by the unpredictability of ecological communities in the changing environment. Particularly, the sustainability of reconstructed 'historic' ecosystems appears to be an unlikely goal in the ever-changing and unpredictable future environment. This paper calls for a shift in the restoration paradigm from 'historic' to 'futuristic.' A 'futuristic' restoration is: (i) to set realistic and dynamic (instead of static) goals for future, instead of past, environment; (ii) to assume multiple trajectories acknowledging the unpredictable nature of ecological communities and ecosystems; (iii) to take an ecosystem or landscape approach, instead of ad-hoc gardening, for both function and structure; (iv) to evaluate the restoration progress with explicit criteria, based on quantitative inference; and (v) to maintain

long-term monitoring of restoration outcomes. A theoretical framework for 'futuristic' restoration, in terms of goals, trajectories, evaluation criteria, and monitoring, along with a historical perspective is presented in this paper.

Chou, W. R., K. S. Tew and L. S. Fang (2002). "Long-term monitoring of the demersal fish community in a steel-slag disposal area in the coastal waters of Kaohsiung, Taiwan." *Ices Journal of Marine Science* **59**: S238-S242. <Go to ISI>://000179243500038

Dumping of approximately two million tonnes of steel slag in a shallow (ca. 40 m), sandy-bottom area in southern Taiwan from 1984 to 1989 has caused major changes of the substrate. After cessation of slag disposal, the demersal fish community in the area was monitored for 9 years (1990-1998). Species richness and the Shannon diversity index at the disposal site and a control site were significantly different, while the number of individuals and the Index of Multivariate Dispersion, as a measure of relative variation, were not. Splitting the data according to three 3-year periods did not reveal significant differences in any of the univariate community metrics. However, multivariate analysis revealed significant temporal differences, dispersion becoming smaller over time. It is concluded that slag disposal created a reef-like habitat and the associated fish fauna had a higher diversity than that seen on the sandy bottom present originally, partly caused by increased habitat complexity and partly by diversion of fishing activities because of potential gear damage. However, in the long run the ecological benefits may not last because the habitat is gradually being covered up again by sand. (C) 2002 International Council for the Exploration of the Sea. Published by Elsevier Science Ltd. All rights reserved.

Chourrout, D. (1995). Genetically modified fish: technologies and their potential environmental impacts. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press. pp 223-31

Clark, R. A., C. L. J. Frid and K. R. Nicholas (2003). "Long-term, predation-based control of a central-west North Sea zooplankton community." *Ices Journal of Marine Science* **60**(2): 187-197. <Go to ISI>://000220347100002

Long-term monitoring of the zooplankton community at a station 5.5 miles from the English coast in the central-west North Sea has been performed since 1968. Analyses of these data have revealed an inverse relationship between annual total zooplankton abundance and the position of the Gulf Stream North Wall (GSNW). This long-term relationship is opposite to the long-term positive association observed between the GSNW and total zooplankton abundances throughout most of the oceanic NE Atlantic region and the northern and central North Sea using Continuous Plankton Recorder data. This study investigates the mechanism behind the inverse relationship with the GSNW, focussing on the importance of zooplankton predators in influencing long-term changes in the zooplankton community of the central-west North Sea. The results suggest that the dominant zooplankton predator *Sagitta elegans* plays a key role in mediating spring copepod population growth rates and thus their maximum and overall productivity during any one particular year. In turn, the abundance of *Sagitta* during the spring appears to be related to climatic factors. The implications of this on the zooplankton community are discussed. (C) 2003 International Council for the Exploration of the Sea. Published by Elsevier Science Ltd. All rights reserved.

Clements, W. H. (2004). "Small-scale experiments support causal relationships between metal contamination and macroinvertebrate community responses." *Ecological Applications* **14**(3): 954-967. <Go to ISI>://000222174000026

Routine biomonitoring studies that compare abundance of benthic macro-invertebrates upstream and downstream from contaminant discharges generally cannot be used to demonstrate causal relationships between stressors and biological responses. In this study I describe stream microcosm and field experiments designed to support results of a 12-year monitoring project in the metal-polluted Arkansas River, Colorado. Microcosm experiments established concentration-response relationships between heavy metals and several structural (abundance, richness) and functional (macroinvertebrate drift, community respiration) endpoints. EC10 values, the metal concentration that reduced abundance or richness by 10%, were generally lowest for mayflies and stoneflies, indicating greater metal sensitivity for these groups. Macro invertebrate drift and community respiration showed highly significant concentration-response relationships with heavy metals and were generally more sensitive than structural measures. Potential interactions among metals were investigated, by comparing community-level responses to Zn alone, Zn+Cd, and Zn+Cu+Cd. Results showed that macroinvertebrate responses to a mixture of three metals were generally greater than responses to either Zn alone or Zn+Cd. Long-term monitoring in the Arkansas River (Colorado) before and after remediation of metal inputs provided correlative evidence that elevated heavy metal concentrations altered community composition and reduced abundance of metal-sensitive organisms. However, these field data were not especially useful for estimating safe concentrations of heavy metals that would be protective of benthic communities. Microcosm and field experiments provided further support for the hypothesis that metals caused alterations in benthic community structure and provided more precise estimates of safe metal concentrations.

Council of Europe (1995). Potential long-term ecological impact of genetically modified organisms. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, 24-26 November 1993, Council of Europe Press. pp 320

Courchamp, F., J. L. Chapuis and M. Pascal (2003). "Mammal invaders on islands: impact, control and control impact." *Biological Reviews* **78**(3): 347-383. <Go to ISI>://000185687200001

The invasion of ecosystems by exotic species is currently viewed as one of the most important sources of biodiversity loss. The largest part of this loss occurs on islands, where indigenous species have often evolved in the absence of strong competition, herbivory, parasitism or predation. As a result, introduced species thrive in those optimal insular ecosystems affecting their plant food, competitors or animal prey. As islands are characterised by a high rate of endemism, the impacted populations often correspond to local subspecies or even unique species. One of the most important taxa concerning biological invasions on islands is mammals. A small number of mammal species responsible for most of the damage to invaded insular ecosystems: rats, cats, goats, rabbits, pigs and a few others. The effect of alien invasive species may be simple or very complex, especially since a large array of invasive species, mammals and others, can be present simultaneously and interact among themselves as well as with the indigenous species. In most cases, introduced species generally have a strong impact and they often are responsible for the impoverishment of the local flora and fauna. The best response to these effects is almost always to control the alien population, either by regularly reducing their

numbers, or better still, by eradicating the population as a whole from the island. Several types of methods are currently used: physical (trapping, shooting), chemical (poisoning) and biological (e.g. directed use of diseases). Each has its own set of advantages and disadvantages, depending on the mammal species targeted. The best strategy is almost always to combine several methods. Whatever the strategy used, its long-term success is critically dependent on solid support from several different areas, including financial support, staff commitment, and public support, to name only a few. In many cases, the elimination of the alien invasive species is followed by a rapid and often spectacular recovery of the impacted local populations. However, in other cases, the removal of the alien is not sufficient for the damaged ecosystem to revert to its former state, and complementary actions, such as species re-introduction, are required. A third situation may be widespread: the sudden removal of the alien species may generate a further disequilibrium, resulting in further or greater damage to the ecosystem. Given the numerous and complex population interactions among island species, it is difficult to predict the outcome of the removal of key species, such as a top predator. This justifies careful pre-control study and preparation prior to initiating the eradication of an alien species, in order to avoid an ecological catastrophe. In addition, long-term monitoring of the post-eradication ecosystem is crucial to assess success and prevent reinvasion.

Crawford, C. (2003). "Environmental management of marine aquaculture in Tasmania, Australia." *Aquaculture* **226**(1-4): 129-138. <Go to ISI>://000185998700011

Marine farming is an important rural industry in coastal bays and estuaries of Tasmania. The two main species cultured are the introduced Pacific oyster, *Crassostrea gigas*, and Atlantic salmon, *Salmo salar*. Legislation has been introduced to assist the development of aquaculture, and this includes requirements for environmental management, such as baseline assessments and routine monitoring of leases. Local impacts on the seabed around salmon farms are monitored using video footage, analysis of benthic invertebrate infauna, and chemical measures (redox and organic matter). Monitoring of shellfish farms is minimal because our research has shown that shellfish culture is having little impact on the environment. Research related to management of aquaculture wastes is ongoing. Studies include investigating appropriate inexpensive measures for an industry-wide long-term monitoring program. Mitigation measures against excessive loadings of organic matter from fish farms, mainly by fallowing, i.e. rotating the position of fish pens around a lease, are currently being researched. Rates of recovery of a heavily impacted salmon lease area after the removal of fish have also been studied. A new project is investigating system-wide effects of salmon farming on the environment, in particular, increased release of nutrients into waterways. This includes monitoring dissolved oxygen, nutrients and phytoplankton, modelling the system, and investigating ecological indicators of eutrophication. (C) 2003 Elsevier B.V. All rights reserved.

Crawley, M. J. (1995). Long term ecological impacts of the release of genetically modified organisms. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press. pp 43-69

Crick, H. Q. P., S. R. Baillie and D. I. Leech (2003). "The UK Nest Record Scheme: its value for science and conservation." *Bird Study* **50**: 254-270. <Go to ISI>://000186700200006

Capsule A review of its methodology, analytical procedures and uses. Aims To provide a comprehensive review of the UK Nest Record Scheme (NRS), its methodology and value to science and conservation. Methods We reviewed the history of the development and current methodology used in the analysis of NRS data in the scientific literature and unpublished documents and from our personal knowledge. Results The British Trust for Ornithology's (BTO's) NRS is the largest, longest running and most highly computerized such scheme in the world. Advanced and efficient techniques of data gathering, data capture and analysis are used. It was founded in 1939 to provide information on the breeding biology of birds, but has since developed into a key component of the overall monitoring strategy for birds in the UK. A range of specialized analytical methods is available for NRS data and potential biases need careful treatment. More than 250 scientific publications have used NRS data to describe aspects of basic breeding biology and performance, to study the population dynamics of bird populations and to investigate the demographic causes of bird population declines in the UK. Conclusions Extensive long-term monitoring schemes, such as the NRS, that collate large historical data sets will become increasingly valuable for monitoring the impact of environmental change. While aspects of the NRS, its recording methods, data capture and analysis can be developed further, the scheme will continue to advance our understanding of both the impacts of new environmental stresses in the UK and the effectiveness of new conservation measures in the wider countryside. This has been amply demonstrated by its use for exploring the impacts of global climate change on the UK's avifauna.

Cumming, A. and J. Macbeth (2004). "The thermal evolution following a superburst on an accreting neutron star." *Astrophysical Journal* **603**(1): L37-L40. <Go to ISI>://000189344000010

Superbursts are very energetic type I X-ray bursts discovered in recent years by long-term monitoring of X-ray bursters and are believed to be due to unstable ignition of carbon in the deep ocean of the neutron star. In this Letter, we follow the thermal evolution of the surface layers as they cool following the burst. The resulting light curves agree very well with observations for layer masses in the range 10(25)-10(26) g expected from ignition calculations and for an energy release greater than or similar to 10(17) ergs g(-1) during the flash. We show that at late times the cooling flux from the layer decays as a power law F proportional to $t^{-(4/3)}$, giving timescales for quenching of normal type I bursting of weeks, in good agreement with observational limits. We show that simultaneous modeling of superburst light curves and quenching times promises to constrain both the thickness of the fuel layer and the energy deposited.

Cutispoto, G., S. Messina and M. Rodono (2003). "Long-term monitoring of active stars - X. Photometry collected in 1994." *Astronomy & Astrophysics* **400**(2): 659-670. <Go to ISI>://000181298700030

As part of an extensive program focused on the global properties and evolution of active stars, high-precision UBVR(I)(c) and UBVR(I)(c) photometry of 18 selected stars is presented. UBVR(I)(c) observations were collected at the European Southern Observatory over the intervals 21-28 September 1994 and 25 November-05 December 1994. Additional UBVR photometry obtained late in 1994 by Catania Astrophysical Observatory Automatic Photoelectric Telescope is also presented. Significant evolution of the light curves, period variations and evidence for long-term variability of the global degree of spottedness are found. Some spectral classifications are revised and photometric parallaxes are compared, whenever possible, with the values measured by the Hipparcos satellite. These observations are finalized to the construction of an

extended photometric database, which can give important clues on topics such as the stability of spotted areas, differential stellar rotation, solar-like activity cycles and the correlation between inhomogeneities at different atmospheric levels.

Dalal, R. C., R. Eberhard, T. Grantham and D. G. Mayer (2003). "Application of sustainability indicators, soil organic matter and electrical conductivity, to resource management in the northern grains region." *Australian Journal of Experimental Agriculture* **43**(3): 253-259. <Go to ISI>://000182063200006

Sustainability is a multifaceted concept. It is expressed here as 'to ensure that the past and current management and use of natural resources does not diminish their capacity to meet economic, environmental, social and aesthetic needs and opportunities of the present and future generations'. Sustainability indicators can be used to monitor responses in condition and trend as a result of natural resource management. We report here 2 case studies that demonstrate the significance of sustainability indicators in discerning trends in land and water resources in the southern Brigalow (*Acacia harpophylla*) Belt, a major region of the Queensland Murray - Darling Basin. First, soil organic matter was used as a sustainability indicator of soil productivity, soil aggregation, and its association with soil sodicity since these soil attributes affect infiltration rates, runoff and drainage. The second study involved comparing the trends in stream salinity (electrical conductivity) over 35 years and sustainability indicators for a dominant Vertosol in a region used for cereal cropping. Groundwater level and electrical conductivity of a long-term monitoring bore in the Dalby - Chinchilla region, were also analysed to discern trends in salinity and association of the groundwater with soil and stream salinity. Soil organic matter declined exponentially as the cultivation period for cereal cropping increased. This resulted in a reduction in soil nitrogen supply, and lower grain protein and cereal grain yields. The associated effects were reduced soil aggregation and increased soil sodicity. Electrical conductivity of the soil as well as stream water showed weak but declining trends with time. Groundwater level from the long-term monitoring bore near the stream and groundwater salinity showed significantly declining trends over the 35 years sampling period. Groundwater salinity was similar to the Vertosol electrical conductivity at 240 - 300 cm depths, suggesting groundwater connectivity to the overlying soil. Thus, use of sustainability indicators provided a strong association among the various attributes of the landscape. However, it is still a challenge to integrate the various sustainability indicators in a landscape context, integrated over space (spatial and geographical distribution), attributes (quality characteristics) and time (trend).

De Marco, M. A., E. Foni, L. Campitelli, E. Raffini, M. Delogu and I. Donatelli (2003). "Long-term monitoring for avian influenza viruses in wild bird species in Italy." *Veterinary Research Communications* **27**: 107-114. <Go to ISI>://000185514200017

De Marinis, E., P. Picco and R. Meloni (2003). "Monitoring polynyas with Ocean Acoustic Tomography: a feasibility study in Terra Nova Bay." *Antarctic Science* **15**(1): 63-75. <Go to ISI>://000181701700009

This study looks at the feasibility of using Ocean Acoustic Tomography for long-term monitoring of polynyas using both observations in Terra Nova Bay polynya (Ross Sea) and simulations with a range dependent, multi-layered adiabatic normal mode acoustic propagation model. The summer sound speed profile is characterized by surface values of around 1450 m s⁻¹, a minimum of 1441 m s⁻¹ around 50 m depth and a linear increase with a 0.016 s⁻¹ slope. Thus, the sound propagation is apparently ducted in the near surface layer and is refracted upward below it. During winter, due to water cooling and mixing processes, the subsurface minimum disappears, the surface sound speed is about 1440 m s⁻¹ and no near surface layer ducted propagation occurs. Because of the specificity of the Terra Nova Bay seasonal sound speed profile and to cope with both deep and shelf water applicability, the feasibility study of acoustic inversion was undertaken using normal mode Match Field Tomography instead of the more classical travel-time inversion. The results from simulations demonstrate that ocean acoustic tomography is able to reproduce quite well the vertical sound speed profile, in particular the temporal evolution of summer stratification and winter mixing processes, thus providing information on the upper layer, where direct measurements are not possible.

DeHaan, K. R., G. T. Vessey, D. A. Holmstrom, J. A. MacLeod, J. B. Sanderson and M. R. Carter (1999). "Relating potato yield to the level of soil degradation using a bulk yield monitor and differential global positioning systems." *Computers and Electronics in Agriculture* **23**(2): 133-143. <Go to ISI>://000082900200005

The adoption of soil conservation practices is often dependent on linking reductions in crop productivity to declines in soil and land quality. A bulk yield monitoring system was installed on a commercial potato harvester for the purpose of showing a relationship between potato yield and the level of degradation on fine sandy loam soils (Orthic Podzols) in the cool, humid climate of Prince Edward Island, Atlantic Canada. Although data are preliminary, initial results indicate that potato yields will be substantially reduced as a result of soil physical properties being altered by excessive long-term soil degradation. Significant correlations were identified between potato yield and a number of physical factors representative of soil degradation including the slope length and steepness factor, cation exchange capacity, depth of topsoil and water holding capacity. If, after confirmation from further study, the relationship between potato yield and the level of soil degradation can be quantified, it will provide a valuable tool in terms of encouraging farmers to adopt soil conserving practices. (C) 1999 Elsevier Science B.V. All rights reserved.

Dehne, M. G., A. Sablotzki, J. Muhling, K. L. Dehne, R. Rohrig and G. Hempelmann (2002). "Long-term monitoring of renal function in poly-traumatized intensive care patients." *Renal Failure* **24**(4): 493-504. <Go to ISI>://000177753400010

Introduction: For the long-term monitoring of kidney function, polytraumatized patients were examined and routine as well as specialized parameters were compared. Materials and methods: 30 patients of the Surgical Intensive Care Unit (ICU) were examined daily over the entire period they stayed in the ICU. The patients were retrospectively classified as either survivors or deceased patients. Group 1 consisted of 20 patients who resided in the ICU for 11-15 (Median 14) days before they could be transferred to a normal hospital unit. Group 2 consisted of 10 patients who had passed away after 13-18 (Median 16) days in the ICU. In addition to the routine parameters diuresis, serum creatinine and serum urea, specialized parameters for kidney function including the excretion rates of alpha1-microglobulin (alpha1-MG), N-Acetyl-beta-D-glucosaminidase (NAG), angiotensinase A (ATA) and immunoglobulin G (IgG) were determined. Results: Similar biometric data were shown by all patients at admission into the ICU, but differences did exist regarding the Revised Trauma Score, Injury Severity Score and the APACHE-II-Score. In the period between the 5th and 8th day of intensive treatment almost all patients showed pathological excretion rates of tubular and glomerular parameters whereby no

increased frequency of unusual events could be determined at these time-points. Conclusion: During treatment in the ICU, all examined patients showed at times pathological excretion rates of specialized kidney function parameters. Such transient damage was only apparent in a few of the patients when the standard parameters serum creatinine and serum urea were employed. In 90% of the surviving patients the kidney parameters had normalized until the time they were transferred, indicating that such parameters reflected the general state of health of these patients.

Denison, R. F., D. C. Bryant and T. E. Kearney (2004). "Crop yields over the first nine years of LTRAS, a long-term comparison of field crop systems in a Mediterranean climate." *Field Crops Research* **86**(2-3): 267-277. <Go to ISI>://000220297200014

The Long-Term Research on Agricultural Systems (LTRAS) experiment has been monitoring the long-term effects of conventional and alternative practices on crop yields and soil properties since 1993, with a planned duration of 100 years. Data for the first 9 years are presented here. Ten, 2-year rotations, each with three 0.4 ha plots per phase of the rotation, range from low-input tilled unfertilized wheat to high-input irrigated conventional and organic maize-tomato systems. For years 3-9, average yields of alternative (organic and green manure) systems were significantly lower than those of comparable conventional systems, except that there were no significant differences in average yields of tomato. Delayed seeding after a winter legume cover crop (LCC) limited maize yields. Yield trends over years were somewhat obscured by variability due to weather. Negative yield trends over years in unfertilized wheat controls were statistically significant, but only when data for the 9th year were included. Yield trends for organic maize were also significantly negative, but tomato yields in the same system showed a significant positive trend, as did yields of conventional maize. As this experiment continues, long-term trends in soil properties and processes could alter the magnitude or direction of trends seen to date. (C) 2003 Elsevier B.V. All rights reserved.

Dhara, V. R. and R. Dhara (2002). "The Union Carbide disaster in Bhopal: A review of health effects." *Archives of Environmental Health* **57**(5): 391-404. <Go to ISI>://000181523000001

The authors have reviewed studies of human health effects that resulted from exposure to methyl isocyanate gas that leaked from the Union Carbide plant in Bhopal, India, in 1984. The studies were conducted during both the early and late recovery periods. Major organs exposed were the eyes, respiratory tract, and skin. Although mortality was initially high, it declined over time, but remained elevated among the most severely exposed population. Studies conducted during the early recovery period focused primarily on ocular and respiratory systems. Major findings included acute irritant effects on the eyes and respiratory tract. In follow-up studies, investigators observed persistent irritant effects, including ocular lesions and respiratory impairment. Studies conducted during the late recovery period focused on various systemic health endpoints. Significant neurological, reproductive, neurobehavioral, and psychological effects were also observed. Early and late recovery period studies suffered from several clinical and epidemiological limitations, including study design, bias, and exposure classification. The authors herein recommend long-term monitoring of the affected community and use of appropriate methods of investigation that include well-designed cohort studies, case-control studies for rare conditions, characterization of personal exposure, and accident analysis to determine the possible components of the gas cloud.

Doherty, M. J., S. Jayadev, J. W. Miller, D. F. Farrell, M. D. Holmes and C. B. Dodrill (2003). "Age at focal epilepsy onset varies by sex and hemispheric lateralization." *Neurology* **60**(9): 1473-1477. <Go to ISI>://000182754100016

Background: Previous studies have shown that interictal epileptiform discharges favor the left hemisphere in adults but the right side in children up until age 5. This may be due to sex-influenced asymmetric brain maturation. To clarify this relationship, the authors analyzed age at epilepsy onset by sex and by lateralization of epileptiform activity. Methods: An adult epilepsy center long-term monitoring database was used to define patients with exclusively unilateral epileptiform findings. Three groups were studied: any epileptiform activity (n = 404), ictal activity (n = 287), and interictal activity (n = 265). The second and third groups were drawn from the first group and the second and third groups overlapped with each other. Side of lateralized finding and sex were analyzed via factorial two-way analysis of variance with the outcome variable being age at epilepsy onset. Comparison analysis included patients with generalized epilepsy (n = 114), nonepileptic seizures (NES, n = 232), and surgical mesial temporal sclerosis (MTS, n = 116). Results: Patients with unilateral epileptiform activity displayed bimodal epilepsy onset ages with infant and adolescent peaks. For patients with a right-sided focus, epilepsy onset was earlier in men (14.4 years) than women (20.7 years). In contrast, among patients with a left-sided focus, epilepsy began earlier in women (18.2 years) than men (19.9 years, p < 0.01). Parallel results were found in unilateral ictal (p < 0.01) and unilateral interictal activity (p = 0.01). Patients with surgical MTS, NES, or generalized seizure showed no similar patterns. Conclusions: In adult patients with focal epilepsy, sex and lateralized epileptiform abnormalities may be related to age at epilepsy onset.

Donnan, G. A., H. M. Dewey and B. R. Chambers (2004). "Warfarin for atrial fibrillation: the end of an era?" *Lancet Neurology* **3**(5): 305-308. <Go to ISI>://000221160700024

Background Warfarin has been in routine clinical use for more than 50 years; however, it was not proven to be of benefit in both primary and secondary prevention of stroke for patients with non-valvular atrial fibrillation (AF) until about a decade ago. Despite its efficacy in reducing the risk of stroke in patients with AF by about 60%, with an absolute reduction of about 3% per year, there have always been barriers to its use. These barriers have included the need for monitoring the degree of anticoagulation with blood tests to measure the international normalised ratio, frequent dose adjustments to maintain this ratio within quite a narrow therapeutic range, and the risk of bleeding should the upper limits of this range be exceeded. Aspirin has also been used but is less effective. Recent developments New oral drugs are being tested; these may be as effective at reducing stroke risk as warfarin in patients with AF. Direct thrombin inhibitors such as ximelagatran are not inferior to warfarin and, based on results from the SPORTIF III and V trials, are perhaps safer, with no need for long-term monitoring and dose adjustment. However, the side-effect of raised amounts of the liver enzyme alanine aminotransferase in 6% of patients needs to be resolved. In the ACTIVE trial, the efficacy of a combination of antiplatelet drugs (aspirin plus clopidogrel) is being tested against dose-adjusted warfarin; and in AMADEUS, the factor-Xa inhibitor and pentasaccharide idraparinux is being assessed in a similar way. Several surgical procedures and devices are also being developed to control AF rhythm and prevent stroke. Where next? The place of these new drugs in the management of AF needs to be established. In the short term, it seems that ximelagatran will replace warfarin in patients for whom there is evidence of a favourable risk-to-benefit ratio. The SPORTIF population consists of patients with AF plus at least one risk

factor. More information about the effect of raised liver enzymes will probably not be available until phase IV studies are completed. Combination antiplatelet drugs need to be tested further- perhaps even triple therapy with aspirin, clopidogrel, and dipyridamole-if the results of ACTIVE are encouraging. The place of surgical procedures and devices to control rhythm and prevent stroke is unclear. Whatever happens, there is a high probability that the days of warfarin are numbered.

Doran, N. E., J. Balmer, M. Driessen, R. Bashford, S. Grove, A. M. M. Richardson, J. Griggs and D. Ziegeler (2003). "Moving with the times: baseline data to gauge future shifts in vegetation and invertebrate altitudinal assemblages due to environmental change." *Organisms Diversity & Evolution* 3(2): 127-149. <Go to ISI>://000184292200008

A long-term monitoring program has been established in Tasmania, Australia, as a Satellite Project for the International Biodiversity Observation Year (IBOY). This program aims to monitor distributional change in vegetation and fauna assemblages along an altitudinal gradient (70-1300 m) in response to climate change and other environmental events. Baseline data collected over a two-year period will be available for comparison with data collected in future decades. The vegetation varies with altitude and fire history. The rate of change in vegetation is not continuous along the altitudinal gradient, but is most rapid above 700 m and below the treeline at 1000-1100 m. Most vascular plant species reach the limit of their distribution within this zone. Despite their preliminary nature, the invertebrate data also display altitudinal and seasonal patterns. The treeline and the 700-1000 m zone again appear to be notable in terms of invertebrate distribution. While the composition of ground-based taxa may be closely related to the floristic composition of the vegetation (or its environmental drivers), the airborne invertebrate fauna appears to be more closely related to structural characteristics such as height and density. Of all taxa, the Coleoptera appear to be the best potential indicators across most altitudes and times. Although the current data provide a wealth of inventory and distributional information over altitude, their greatest potential value lies in long-term comparative information. Future sampling should focus not only on changes at and above the treeline, but also on the zone below this where many species are at their altitudinal limits and may be particularly sensitive to climate change.

Dziak, R. P., D. R. Bohnenstiehl, H. Matsumoto, C. G. Fox, D. K. Smith, M. Tolstoy, T. K. Lau, J. H. Haxel and M. J. Fowler (2004). "P- and T-wave detection thresholds, Pn velocity estimate, and detection of lower mantle and core P-waves on ocean sound-channel hydrophones at the Mid-Atlantic Ridge." *Bulletin of the Seismological Society of America* 94(2): 665-677. <Go to ISI>://000221200900021

Since 1999 six Sound Fixing and Ranging (SOFAR) hydrophones have been moored along the Mid-Atlantic Ridge (MAR) (15degrees- 35degrees N). These hydrophones (8-bit data resolution) are designed for long-term monitoring of MAR seismicity using the acoustic T waves of seafloor earthquakes. The completeness level of the MAR T-wave earthquake catalog estimated from size- frequency constraints is m(b) similar to 3.0, a significant improvement in detection compared to the m(b) 4.6 completeness level estimated from National Earthquake Information Center magnitude-frequency data. The hydrophones also detect the acoustic phase of converted upper mantle P arrivals from regional earthquakes at epicentral distances of 374-1771 km and from events as small as m(b) 3.6. These regional P waves are used to estimate a Pn velocity of 8.0 +/- 0.1 km sec(-1) along the east and west MAR flanks. An unexpected result was the identification of P arrivals from earthquakes outside the Atlantic Ocean basin. The hydrophones detected P waves from global earthquakes with magnitudes of 5.8-8.3 at epicentral distances ranging from 29.6degrees to 167.2degrees. Examination of travel times suggests these teleseismic P waves constitute the suite of body-wave arrivals from direct mantle P to outer- and inner-core reflected/refracted phases. The amplitudes of the teleseismic P waves also exhibit the typical solid-earth wave field phenomena of a P shadow zone and caustic at Delta similar to 144degrees. These instruments offer a long-term, relatively low-cost alternative to ocean-bottom seismometers that allows for observation of Pn velocities and mantle/core phases arriving at normally inaccessible deep-sea locations.

Ekenler, M. and M. A. Tabatabai (2003). "Effects of liming and tillage systems on microbial biomass and glycosidases in soils." *Biology and Fertility of Soils* 39(1): 51-61. <Go to ISI>://000186686800008

This study was undertaken to investigate the long-term influence of lime application and tillage systems (no-till, ridge-till and chisel plow) on soil microbial biomass C (C-mic) and N (N-mic) and the activities of glycosidases (alpha- and beta-glucosidases, alpha- and beta-galactosidases and beta- glucosaminidase) at their optimal pH values in soils at four agroecosystem sites [Southeast Research Center (SERC), Southwest Research Center (SWRC), Northwest Research Center (NWRC), and Northeast Research Center (NERC)] in Iowa, USA. Results showed that, in general, the C-mic and N-mic values were significantly (P <0.001) and positively correlated with soil pH. Each lime application and tillage system significantly (P <0.001) affected activities of the glycosidases. With the exception of alpha-glucosidase activity, there was no limetillage interaction effect. Simple correlation coefficients between the enzyme activities and soil pH values ranged from 0.51 (P <0.05) for the activity of alpha- glucosidase at the NWRC site (surface of the no-till) to 0.98 (P <0.001) at the SWRC site. To assess the sensitivity of the enzymes to changes in soil pH, the linear regression lines were expressed in Deltaactivity/DeltapH values. In general, their order of sensitivity to changes in soil pH was consistent across the study sites as follow: beta-glucosidase>beta- glucosaminidase>beta-galactosidase>alpha-galactosidase>alpha- glucosidase. Lime application did not significantly affect the specific activities (g p -nitrophenol released kg(-1) soil organic C h(-1)) of the enzymes. Among the glycosidases studied, beta-glucosidase and beta-glucosaminidase were the most sensitive to soil management practices. Therefore, the activities of these enzymes may provide reliable long-term monitoring tools as early indicators of changes in soil properties induced by liming and tillage systems.

Ellingson, A. R. and P. M. Lukacs (2003). "Improving methods for regional landbird monitoring: a reply to Hutto and Young." *Wildlife Society Bulletin* 31(3): 896-902. <Go to ISI>://000186012500038

Hutto and Young (2002) advocate an approach for regional-scale landbird monitoring that is based on convenience sampling and index values. We take issue with their methods and argue that convenience sampling and index values do not provide credible data from which to make inference about population dynamics. We clarify misconceptions of distance sampling from Hutto and Young used to dismiss the utility of the method. Instead we propose that monitoring programs must address the issues of variable detectability and sound survey design, emphasizing rigor in all steps of the planning process.

Ervin, D. E., R. Welsh, S. S. Batie and C. L. Carpentier (2003). "Towards an ecological systems approach in public research for environmental regulation of transgenic crops." *Agriculture Ecosystems & Environment* **99**(1-3): 1-14.<Go to ISI>://000186022300001

A review of current research shows insufficient monitoring and testing have been conducted to reliably assess the degree of environmental risks posed by transgenic crops. The major risks include increased resistance to particular pesticides, gene flow into related plant species, and negative effects on non-target organisms. Significant gaps in knowledge, often stemming from missing markets for ecological services, warrant a cautious environmental regulatory approach for transgenic crops. The objective of this paper is to identify the types of ecological systems public research to implement effective biosafety controls. US biosafety regulatory processes tend to focus on controlling type I error, i.e. restricting the release of the crops when significant environmental risks do not exist, because the economic losses from denying commercialization can be estimated. However, the precautionary principle, which focuses on controlling type II errors, i.e. releasing the crops when serious ecosystem damage will occur, adds a necessary criterion given the current deficit in ecological science. The key challenge facing regulators is to find the appropriate balance of controlling type I versus type II errors. The research program should embed the lessons of evolutionary biology and ecological sciences. Viewing the plant as a production machine that can be "brute-force" reengineered for more efficiency is a poor analogy. Unanticipated and unintended results, positive and negative, will emerge from such engineering because plants are complex systems embedded in poorly understood, complex, and interacting ecosystems. An ideal public research program should capture the interconnectedness of ecological systems, the essential roles of ecosystem services, nonlinear and threshold responses to accumulating stresses, and global expansion of the technology. Basic elements of such a program include long-term studies of cumulative and synergistic pesticide resistance effects, potential gene flow problems for those transgenic crop trait-weed complexes with high probabilities of outcrossing and ecological disruption, and scientific protocols for assessing deleterious effects on non-target organisms. For all three effects, expanded ecosystem monitoring of the commercialized crops in varied settings is needed for improved type II error definitions and estimates. The development of improved risk analysis methodologies and protocols should also be a priority. Finally, scientific effort to stimulate precautionary research, such as the development of transgenic crops that mimic ecological systems functioning, could avert many risks. Creating information to avoid significant ecological damages and foster precautionary research and development for transgenic crops are neglected roles of public biotechnology research. (C) 2003 Elsevier Science B.V. All rights reserved.

Farrell, A. C. and R. B. Scheckenberger (2003). "An assessment of long-term monitoring data for constructed wetlands for urban highway runoff control." *Water Quality Research Journal of Canada* **38**(2): 283-315.<Go to ISI>://000183229700005

Constructed wetlands have gained acceptance as a means of treating stormwater runoff from urban developments. Much of the available data regarding the performance of these facilities is based upon monitoring conducted over the course of less than two years, and as such inherently assumes that the period of analysis represents the "typical" or "design" conditions under which these facilities are intended to operate. While this information has provided guidance regarding the mechanisms by which wetlands provide quality treatment of urban runoff, it does not fully reflect the variability of conditions under which the facilities operate over the fullness of time, which is of particular concern to designers and operators. The construction of the Dartnall Road Interchange, as part of Hamilton's Lincoln Alexander Parkway, required a monitoring program-which included five years of water quality sampling-as a condition of approval by the Department of Fisheries and Oceans. This paper reports on the quantitative and qualitative wetland water quality monitoring data (sediment, nutrients, metals) obtained over the course of a total seven-year program, and provides information regarding the operating conditions and estimates on contaminant removal efficiencies from the facilities.

Farrell, E. P., J. Aherne, G. M. Boyle and N. Nunan (2001). "Long-term monitoring of atmospheric deposition and the implications of ionic inputs for the sustainability of a coniferous forest ecosystem." *Water Air and Soil Pollution* **130**(1-4): 1055-1060.<Go to ISI>://000172012000024

Ionic fluxes in a semi-mature stand of Sitka spruce (*Picea sitchensis* (Bong.) Carr.), on a spodosol in eastern Ireland, were monitored over an eight-year period, 1991-1998. The paper focuses on the long-term viability of forests in this region. Input-output balances, proton budgets and critical loads suggest that the long-term sustainability of forests in the region is threatened unless atmospheric emissions of anthropogenic substances can be controlled.

Felske, A. D. M., W. Fehr, B. V. Pauling, H. von Canstein and I. Wagner-Dobler (2003). "Functional profiling of mercuric reductase (mer A) genes in biofilm communities of a technical scale biocatalyzer." *Bmc Microbiology* **3**: art. no.-22.<Go to ISI>://000186546200001

elemental mercury and has recently been demonstrated to be applicable for industrial wastewater clean-up. The long-term monitoring of such biocatalyser systems requires a cultivation independent functional community profiling method targeting the key enzyme of the process, the merA gene coding for the mercuric reductase. We report on the development of a profiling method for merA and its application to monitor changes in the functional diversity of the biofilm community of a technical scale biocatalyzer over 8 months of on-site operation. Results: Based on an alignment of 30 merA sequences from Gram negative bacteria, conserved primers were designed for amplification of merA fragments with an optimized PCR protocol. The resulting amplicons of approximately 280 bp were separated by thermogradient gelelectrophoresis (TGGE), resulting in strain specific fingerprints for mercury resistant Gram negative isolates with different merA sequences. The merA profiling of the biofilm community from a technical biocatalyzer showed persistence of some and loss of other inoculum strains as well as the appearance of new bands, resulting in an overall increase of the functional diversity of the biofilm community. One predominant new band of the merA community profile was also detected in a biocatalyzer effluent isolate, which was identified as *Pseudomonas aeruginosa*. The isolated strain showed lower mercury reduction rates in liquid culture than the inoculum strains but was apparently highly competitive in the biofilm environment of the biocatalyzer where moderate mercury levels were prevailing. Conclusions: The merA profiling technique allowed to monitor the ongoing selection for better adapted strains during the operation of a biocatalyzer and to direct their subsequent isolation. In such a way, a predominant mercury reducing *Ps. aeruginosa* strain was identified by its unique mercuric reductase gene.

Filatova, L. P., N. S. Lapteva and V. A. Shevchenko (2004). "Long-term monitoring of the ecological situation in industrial sites of Moscow with a *Drosophila melanogaster* test strain." *Russian Journal of Genetics* **40**(3): 263-265.<Go to ISI>://000220453700006

For 12 years, recombination rate was assessed in *Drosophila melanogaster* males exposed on a thermoelectric power station (TPS) of Moscow. In 1994, experiments were also carried out on another Moscow TPS for comparison. The recombination frequency in exposed males was two- or threefold higher than in the control sample. Recombination frequencies observed in different years did not significantly differ from each other. Likewise, no significant difference was observed for the results obtained on two TPSs. A dramatic increase in recombination frequency in flies exposed on TPS was considered as an adequate response to high concentrations of effective mutagens discharged by TPS.

Folster, J., L. Bringmark and L. Lundin (2003). "Temporal and spatial variations in soilwater chemistry at three acid forest sites." *Water Air and Soil Pollution* **146**(1-4): 171-195.<Go to ISI>://000183108400011

As acid deposition declines, recovery from acidification is delayed by the fact that the soil processes that earlier buffered against acidification are now being reversed. Monitoring of within catchment processes is thus desirable. However, soil sampling is destructive and not suitable for long-term monitoring at a single site, whereas sampling of soil water with suction lysimeters may be more suitable. In this paper we evaluate 8-11 years of soil water chemistry from E- and B-horizons in three acid forest soil plots within monitored catchments. Five years of sampling also included the C-horizon. To our knowledge, this is the first long-term lysimeter study including the E-horizon showing recovery from acidification, and one of few studies including the B-horizon. Soil water concentrations of SO₄ decreased significantly between -9.5 and -1.4 mueq L⁻¹ yr⁻¹, with much higher rates of change at two southern sites compared to a northern site, where levels and changes of deposition were lower. The average annual bulk deposition of S ranged between 3 kg S ha⁻¹ at the northernmost site to 11 kg S ha⁻¹ at the southernmost site. The SO₄ decline in E-horizons was smaller than the decline in deposition, which indicated leaching of SO₄ from the O-horizon. At the two southern sites, a weaker decline in SO₄ in the B-horizon compared to the E-horizon indicated desorption of SO₄. The negative trends in SO₄ were to a large extent balanced by decreases in base cations but there were also tendencies of recovery from acidification in soil solution at the southern sites by increasing pH and ANC. However, these were contradicted by increasing Al concentrations. A high influence of marine salts in the early 1990s may have delayed the recovery. Decreasing trends of the Ca/(H⁺)₂ ratio in the soil solution, most pronounced at one of the southern sites, suggested that the soils were becoming more acidic, although the soil solution tended to recover.

Fosang, A. J., H. Stanton, C. B. Little and L. M. Atley (2003). "Neopeptides as biomarkers of cartilage catabolism." *Inflammation Research* **52**(7): 277-282.<Go to ISI>://000184100500001

Progressive degradation of articular cartilage is a central feature of arthritis and a major determinant of long term joint dysfunction. There are no treatments able to halt the progression of cartilage destruction presently available, and monitoring the benefit of potential therapies is hampered by our inability to measure the "health" of articular cartilage. Serial radiographic assessment of joint space narrowing, the current gold standard, requires measurements over a prolonged time (1 - 5 years) and is prone to technical difficulties. Other strategies for evaluating cartilage degradation are needed to enable both short and long term monitoring of disease progression and response to therapy. One avenue that holds promise is the use of biomarkers that accurately reflect the degradative state of the articular cartilage. Antibodies that recognise terminal amino acid sequences generated by proteolysis at specific sites in the core protein of both aggrecan and type II collagen (neopeptide antibodies) have become available in recent years. These antibodies have been invaluable for identifying the proteinases responsible for cartilage breakdown both in vitro and in vivo. The presence of neopeptide sequences generated by specific metalloenzyme cleavage of aggrecan and type II collagen correlates well with the progression of cartilage degeneration, both in vitro and in mouse models of arthritis. Preliminary results with quantitative assays of type II collagen neopeptides suggest that they may be useful markers of joint disease in humans. Long term studies correlating neopeptide concentration with clinical and radiographic disease are now required to validate the utility of neopeptides as surrogate markers of cartilage degeneration and joint disease.

Framme, C. and J. Roeder (2004). "Immediate and long-term changes of fundus autofluorescence in continuous wave laser lesions of the retina." *Ophthalmic Surgery Lasers & Imaging* **35**(2): 131-138.<Go to ISI>://000220206100006

BACKGROUND AND OBJECTIVE: To determine whether fundus autofluorescence imaging is able to show changes in retinal pigment epithelium (RPE) fluorescence after thermal laser photocoagulation. **PATIENTS AND METHODS:** In vivo imaging of fundus autofluorescence was performed with a scanning laser ophthalmoscope. A laser with a wavelength of 488 nm was used for excitation of the tissue and autofluorescence was detected above 500 nm using a barrier filter. One hundred eight eyes of 87 patients who had had previous laser treatment were monitored. The appearance and size of the laser lesions were documented and correlated to the time of treatment. Immediate changes were observed prospectively in 13 eyes; long-term follow-up was studied retrospectively in 95 eyes. **RESULTS:** In all patients but one, autofluorescence was decreased in the area of laser lesions 1 hour after laser treatment. After 1 month, previously decreased autofluorescence in all lesions changed to significantly increased autofluorescence, which was stable up to 6 months after treatment. Mixed forms were present approximately 6 to 12 months after treatment, showing a central island of increased autofluorescence surrounded by a ring of decreased autofluorescence. After 1 to 2 years, lesions again changed to complete dark spots, enlarging later on. **CONCLUSION:** RPE destruction and subsequent proliferation after continuous wave laser photocoagulation can be visualized noninvasively by autofluorescence imaging. Immediate decreased autofluorescence may indicate acute damage of the RPE, subsequent increased autofluorescence seems to indicate proliferative behavior of the RPE, and final dark spots can indicate R-PE atrophy secondary to a denaturation of neurosensory retinal tissue. Thus, autofluorescence can be used in the long-term monitoring of R-PE changes after laser treatment. The enlargement of the laser atrophy zone demonstrates the potential risk of visual loss after central laser photocoagulation even years after treatment.

Freckleton, R. P., A. R. Watkinson, D. J. Webb and T. H. Thomas (1999). "Yield of sugar beet in relation to weather and nutrients." *Agricultural and Forest Meteorology* **93**(1): 39-51.<Go to ISI>://000078582200004

Data on sugar beet yields from a long-term experiment (1965-1993) at IACR Broom's Barn are used, in conjunction with long-term weather data, to assess the degree to which weather affects yield and how this effect is modified by nutrient

availability. Mean temperatures and rainfall during July and August were strongly correlated with sugar beet yields, as well as mean temperature during April and the length of time between sowing and harvest. The data from July and August were entered into a factor analysis to generate two factors describing how hot and dry weather conditions are during July and August. These two factors, as well as April temperature and the length of the growing season, were entered into a multiple regression. The regressions revealed strong effects of the principal axis factors on sugar beet yields across treatments, as well as strong effects of the length of the growing season, but weaker effects of April temperatures. The strength of response to weather was dependent on the nutrient regime, and was, in particular, greater with increased application of nitrogen. There was, however, no effect of nutrient regime on the strength of response of yield to the length of the growing season. These results indicate that weather-induced year-to-year variability in sugar beet yields in unirrigated crops is primarily determined by conditions in July and August as well as the length of time between sowing and harvest, and imply that drought limits yields in well-fertilised crops. The practical implications of these results are that the risk of yield losses due to drought may be minimised by maximising the length of growing season, and that there is the potential for developing simple measures to forecast yields through monitoring of rainfall. (C) 1999 Elsevier Science B.V. All rights reserved.

Fruget, J. F., M. Centofanti, J. Dessaix, J. M. Olivier, J. C. Druart and P. J. Martinez (2001). "Temporal and spatial dynamics in large rivers: example of a long-term monitoring of the middle Rhone River." *Annales De Limnologie-International Journal of Limnology* **37**(3): 237-251. <Go to ISI>://000171361100008

In running water, the main natural factor of disturbance is hydraulic. Investigation of its biological impact is currently complicated by the increase of anthropogenic disturbances which tend to mask the natural functioning of rivers. Monitoring of the impacts of the artificial alterations undergone by the Middle Rhone River for some decades took place in the mid-1980s. Discharge and temperature could constitute the major events controlling the biological dynamics in terms of variations in species richness, diversity, and abundance. The between-years changes of the structure and diversity of macroinvertebrate communities were connected with the amplitude of discharge fluctuations. This was in accordance with the disturbance-diversity concept and it seems to confirm the intermediate disturbance hypothesis. The fish community mainly depended on hydroclimatic factors that influenced breeding success. Variations in nutrient input played a secondary role in controlling changes in some communities (particularly the periphyton). Therefore it appears that the study of long-term changes in river systems, including the dynamics of their biological communities, requires continuous observations and data collection that only medium- to long-term studies can provide, implying the setting up of ecological monitoring centres for the natural environment such as the Long Term Ecological Research (LTER) sites in United States.

Gabelli, F. M., G. J. Fernandez, V. Ferretti, G. Posse, E. Coconier, H. J. Gavieiro, P. E. Llambias, P. I. Pelaez, M. L. Valles and P. L. Tubaro (2004). "Range contraction in the pampas meadowlark *Sturnella defilippii* in the southern pampas grasslands of Argentina." *Oryx* **38**(2): 164-170. <Go to ISI>://000221639400017

The Vulnerable Pampas meadowlark *Sturnella defilippii* (Family Icteridae) is a Neotropical grassland bird that suffered a severe population reduction and range contraction during the 20th century. Formerly distributed across most of the pampas grasslands, it is now confined to the southern tip of its original range. There are small groups of wintering birds in southern Brazil, a small reproductive population in eastern Uruguay, and the main reproductive population occurs on the southern pampas grasslands of Argentina. In this paper we report the results of an extensive field survey of these southern pampas grasslands, carried out to estimate the pampas meadowlark's population size and to identify the factors potentially responsible for its range contraction. During the 1999 breeding season we surveyed a total of 296 sample locations (transects, randomly selected points, and sites checked for nesting site reoccupation). We found 66 reproductive groups of pampas meadowlarks. The minimum population size and extent of occurrence were estimated to be 28,000 individuals and 4,810 km², respectively. This value represents a range contraction of c. 30% compared to that estimated in a study carried out between 1992 and 1996. Pampas meadowlarks reoccupied natural grassland sites for nesting that were used in previous breeding seasons when these sites remained undisturbed. Habitat transformation appears to be the main factor causing the range contraction of the pampas meadowlark. We suggest that long-term monitoring of this population and its preferred habitat, the natural grasslands, is required in order to ensure the conservation of this species.

Gaillard, J. M., P. Duncan, D. Delorme, G. van Laere, N. Pettorelli, D. Maillard and G. Renaud (2003). "Effects of hurricane Lothar on the population dynamics of European roe deer." *Journal of Wildlife Management* **67**(4): 767-773. <Go to ISI>://000186216800012

Although extreme weather events-such as hurricanes-cause obvious changes in landscape and tree cover, the impact of such events on population dynamics of ungulates has not yet been measured accurately. We report a first quantification of the demographic consequences on roe deer (*Capreolus capreolus*) of the strongest hurricane (Lothar) that France has suffered in centuries. Based on long-term monitoring (>20 yr) of known-age individuals in 2 populations, We found that Lothar had no detectable negative effect on age- and sex-specific survival rates, except perhaps for old females. Likewise, although Lothar occurred during the time in the roe deer reproductive cycle when embryos are implanted, we found no evidence of a decrease in either the pregnancy rate or litter size. Our results show that roe deer populations are resistant to this kind of extreme weather event. The consequences for wildlife management are direct and important: (1) the hunting bag was low in 2000 due to restricted hunter access, and (2) the main effect of hurricane Lothar was to create openings within large forests that are good habitat for roe deer. We suggest that Lothar will paradoxically have a positive effect on roe deer population dynamics.

Gaillard, J. M., A. Loison, C. Toigo, D. Delorme and G. Van Laere (2003). "Cohort effects and deer population dynamics." *Ecoscience* **10**(4): 412-420. <Go to ISI>://000187465200003

Among-individual variation of life history traits in a given population of deer has most often been accounted for by differences among sex and age classes and by current environmental variation (mostly changes in density and climatic conditions). However, among-individual differences in fitness can also be generated by differences in environmental conditions during the year of birth. Such cohort effects can be divided into two different components. First, among-year differences in environmental conditions at birth may produce large yearly variation in recruitment that generates a direct numerical effect (i.e., a high proportion of newborns are recruited in good years, whereas very low proportions are

recruited when environmental conditions encountered by newborns during their first weeks of life are poor). Second, when recruited into the population, individuals born in a good year may reproduce earlier, reach a larger body mass, and have a higher reproductive success than individuals born in a poor year. We call the long-lasting influence on individual fitness of environmental conditions during the year of birth a delayed quality effect. Here, we first review briefly evidence of numerical and quality effects recently accumulated in deer populations. Then, by using long-term monitoring (> 20 y) of two contrasted roe deer (*Capreolus capreolus*) populations, we assess the influence of the among-cohort differences in reproductive traits, age- and sex-specific survival rates, and population growth rate. Results show that cohort effects (1) are widespread in deer populations and (2) may have a major influence on population dynamics, especially in low-performance populations. Cohort effects should therefore be accounted for in management plans of deer populations.

Gallo, K., L. Ji, B. Reed, J. Dwyer and J. Eidenshink (2004). "Comparison of MODIS and AVHRR 16-day normalized difference vegetation index composite data." *Geophysical Research Letters* **31**(7): art. no.-L07502.<Go to ISI>://000221075700005

Normalized difference vegetation index (NDVI) data derived from visible and near-infrared data acquired by the MODIS and AVHRR sensors were compared over the same time periods and a variety of land cover classes within the conterminous USA. The relationship between the AVHRR derived NDVI values and those of future sensors is critical to continued long term monitoring of land surface properties. The results indicate that the 16-day composite values are quite similar over the 23 intervals of 2001 that were analyzed, and a linear relationship exists between the NDVI values from the two sensors. The composite AVHRR NDVI data were associated with over 90% of the variation in the MODIS NDVI values.

Gaudeul, M. and I. Till-Bottraud (2004). "Reproductive ecology of the endangered alpine species *Eryngium alpinum* L. (Apiaceae): Phenology, gene dispersal and reproductive success." *Annals of Botany* **93**(6): 711-721.<Go to ISI>://000221871800009

Background and aims *Eryngium alpinum* (Apiaceae) is an endangered perennial, characteristic of the Alpine flora. Because the breeding system influences both demographic (reproductive success) and genetic (inbreeding depression. evolutionary potential) parameters that are crucial for population maintenance, the reproductive ecology of *E. alpinum* was investigated. Specifically, the aims of the study were (1) to determine the factors (resources and/or pollen) limiting plant fitness; and (2) to assess the potential for gene flow within a plant, within a patch of plants, and across a whole valley where the species is abundant. Methods Field experiments were performed at two sites in the Fournel valley, France, over three consecutive years. Studies included a phenological survey, observations of pollinators (visitation rates and flight distances), dispersal of a fluorescent powder used as a pollen analogue, the use of seed traps, determination of the pollen/ovule ratio. and an experiment to test whether seed production is limited by pollen and/or by resources. Key results *E. alpinum* is pollinated by generalist pollinators, visitation rates are very high and seed set is resource-rather than pollen-limited. The short flights of honeybees indicate a high potential for geitonogamy, and low pollen and seed dispersals suggest strong genetic structure over short distances. These results are interpreted in the light of previous molecular markers studies, which, in contrast, showed complete outcrossing and high genetic homogeneity. Conclusions. The study highlights the usefulness of adopting several complementary approaches to understanding the dynamic processes at work in natural populations. and the conservation implications for *E. alpinum* are emphasized. Although the studied populations do not seem threatened in the near future, long-term monitoring appears necessary to assess the impact of habitat fragmentation. Moreover, this study provides useful baseline data for future investigations in smaller and more isolated populations. (C) 2004 Annals of Botany Company.

Glassley, W. E., J. J. Nitao, C. W. Grant, J. W. Johnson, C. I. Steefel and J. R. Kercher (2003). "The impact of climate change on vadose zone pore waters and its implication for long-term monitoring." *Computers & Geosciences* **29**(3): 399-411.<Go to ISI>://000182951400013

Protecting groundwater is of growing interest as pressure on these resources grows. Recharge of groundwater takes place through the vadose zone, where complex interactions between thermal-hydrological-geochemical processes affect water quality. Monitoring processes in the vadose zone is an important means of evaluating the long-term health of aquifer systems. and has become an integral part of many subsurface engineering efforts. Monitoring such systems, however, may be affected by changes in climate that slowly propagate through vadose zone systems. We describe in this paper the use of NUFT- C, a reactive transport simulator designed to run on a high performance, massively parallel computer. to compare quantitatively the evolution of a deep vadose zone with changes expected from an engineered high-level nuclear waste repository. The results suggest that the impacts from waste emplacement are, in some instances, similar to those that would be observed as a result of climate change, whereas others are distinguishable from evolution of the natural system. Such simulations facilitate design of long-term monitoring programs that take account of these complex effect S. The results emphasize the importance of developing long-term baseline measurements and control sites, in order to enhance confidence in interpretations of complexly evolving data sets that will be obtained from multi-decade monitoring efforts. Published by Elsevier Science Ltd.

Gnanadesikan, A., J. L. Sarmiento and R. D. Slater (2003). "Effects of patchy ocean fertilization on atmospheric carbon dioxide and biological production." *Global Biogeochemical Cycles* **17**(2): art. no.-1050.<Go to ISI>://000183102900006

Increasing oceanic productivity by fertilizing nutrient-rich regions with iron has been proposed as a mechanism to offset anthropogenic emissions of carbon dioxide. Earlier studies examined the impact of large-scale fertilization of vast reaches of the ocean for long periods of time. We use an ocean general circulation model to consider more realistic scenarios involving fertilizing small regions (a few hundred kilometers on a side) for limited periods of time (of order 1 month). A century after such a fertilization event, the reduction of atmospheric carbon dioxide is between 2% and 44% of the initial pulse of organic carbon export to the abyssal ocean. The fraction depends on how rapidly the surface nutrient and carbon fields recover from the fertilization event. The modeled recovery is very sensitive to the representation of biological productivity and remineralization. Direct verification of the uptake would be nearly impossible since changes in the air-sea flux due to fertilization would be much smaller than those resulting from natural spatial variability. Because of the sensitivity of the uptake to the long-term fate of the iron and organic matter, indirect verification by measurement of the organic matter flux would require high vertical resolution and long-term monitoring. Finally, the downward displacement of the nutrient profile resulting from an iron-induced productivity spurt may paradoxically lead to a long-term reduction in

biological productivity. In the worst-case scenario, removing 1 ton of carbon from the atmosphere for a century is associated with a 30-ton reduction in biological export of carbon.

Goto, S., M. Kinoshita, O. Matsubayashi and R. P. Von Herzen (2002). "Geothermal constraints on the hydrological regime of the TAG active hydrothermal mound, inferred from long-term monitoring." *Earth and Planetary Science Letters* **203**(1): 149-163. <Go to ISI>://000179078800012

During August 1994 to March 1995, a period that included ODP Leg 158 drilling, bottom-water and sub-bottom temperatures were continuously logged by a long-term temperature monitoring system 'Daibutsu' at the base of the central black-smoker complex (CBC) and within the low heat flow zone at the TAG hydrothermal mound on the Mid-Atlantic Ridge. The temperature of hydrothermal fluid at CBC was also measured with a small high-temperature probe 'Hobo'. Bottom-water temperature variations measured with Daibutsu at both sites have predominant semi-diurnal periods, causing the sub-bottom temperatures to fluctuate at these periods with reduced amplitudes and phase delays at sub-bottom depths. Seawater entrainment into the mound has been previously suggested at the low heat flow zone. We quantitatively evaluate the seawater entrainment rate at both sites from a one-dimensional numerical model, combined with a heat conduction model for the semi-diurnal variations. The entrainment rate of seawater at the base of CBC is estimated as $1.3 \pm 0.5 \times 10^{-5}$ m/s, at least from August 17 to 30, 1994. On the other hand, the seawater entrainment rate at the low heat flow zone was undetected by long-term temperature monitoring at shallow sub-bottom depth. Nevertheless an increase in heat flow observed at the low heat flow zone during ODP drilling can be interpreted as a decrease in the entrainment rate of seawater. Before ODP Leg 158, Daibutsu measured three sub-bottom temperature anomalies at the base of CBC not derived from bottom-water temperature variations and Hobo also detected a CBC fluid temperature anomaly, indicating some natural changes in fluid flow within the mound. Daibutsu and Hobo also measured temperature anomalies during and after drilling at the ODP TAG-1 area. The Hobo temperature anomalies are inferred to have occurred when the cold fluid entrained through the drill holes at TAG-1 site reached or cooled the main fluid path to CBC. The entrained seawater through the drill holes appears to have contributed to dissolution and precipitation of anhydrite within the mound and perhaps affected the local permeability structure inside the mound. The temperature anomalies measured with Daibutsu at the base of CBC may have been induced by the change in the fluid flow pattern as a result of such permeability changes within the mound. (C) 2002 Elsevier Science B.V. All rights reserved.

Goto, S., M. Kinoshita, A. Schultz and R. P. Von Herzen (2003). "Estimate of heat flux and its temporal variation at the TAG hydrothermal mound, Mid-Atlantic Ridge 26 degrees N." *Journal of Geophysical Research-Solid Earth* **108**(B9): art. no.-2434. <Go to ISI>://000187311900001

[1] From August 1994 to March 1995, three 50-m-high vertical thermistor arrays designated "Giant Kelps" (GKs) were deployed around the central black smoker complex (CBC) at the TAG hydrothermal mound, Mid-Atlantic Ridge (26degrees08'N, 44degrees49'W). These were designed to monitor the temporal variability of the vertical temperature distribution in the hydrothermal plume. One small high-temperature probe "Hobo" was also deployed in one of the black smoker vents of CBC. Over the observation period, two typical characteristics are recognized in plume temperatures measured with GKs: (1) the amplitudes of temperature anomalies decrease with increasing height above the top of CBC; (2) maximum temperature anomalies on the upper thermistors occurred periodically and nearly simultaneously across the array about every 6 hours. Conversely, maximum temperature anomalies on the lower thermistors occurred periodically every 12 hours, indicating that the location of the plume discharged from CBC was forcibly moved by the change in direction of tidally modulated current flow. The heat flux from CBC was estimated from temperatures measured by GKs based on a model of buoyant hydrothermal fluid rising in a stable, stratified density environment. The estimated heat flux from CBC gradually decreases from about 86 to 55 MW over the similar to 7 months of measurement, with a mean rate of decrease of 0.17 MW d^{-1} . Since the black smoker effluent temperature measured with Hobo was almost stable over the measurement period, a plausible cause of the decrease is a reduction in the volume of hydrothermal fluid provided to the CBC (in which case the estimated mean rate of decrease in volume flux of CBC is $8.9 \text{ m}^3 \text{ d}^{-1}$). Estimated heat flux, temperature anomalies observed by Hobo, and diffuse flow and subbottom temperature anomalies recorded by other long-term monitoring instruments before, during, and after ODP Leg 158 indicate that the drilling probably affected the fluid flow pattern within the mound but had little effect on the total heat flux from CBC.

Green, N. J. L., J. L. Jones, A. E. Johnston and K. C. Jones (2001). "Further evidence for the existence of PCDD/Fs in the environment prior as 1900." *Environmental Science & Technology* **35**(10): 1974-1981. <Go to ISI>://000168759800011

PCDD/Fs and PCBs have been analyzed in a series of archived soil samples collected from various depths during the 1800s and early 1900s. PCBs were not found in soil samples collected before 1900, whereas PCDD/Fs were present in concentrations between 43 and 110 pg/g in surface soils, and between 9 and 150 pg/g in soils collected from below the surface. The PCDD/F homologue patterns of all surface soils were consistent with each other. The homologue pattern of deeper soils altered with depth to one that was dominated by highly chlorinated PCDDs. The highest Sigma (4-8)PCDD/F concentration (150pg/g) was found in the deepest soil analyzed (230-250 cm below the surface). The cork from one of the storage bottles contained considerable quantities of both PCBs and PCDD/Fs. However, contamination of the soils, either by diffusion through the cork or by cork particles, was discounted on the basis that no PCBs were evident in the soil, and that the PCDD/F homologue pattern in the cork was Very different to that found in the soil. Similar arguments were used to discount contamination of the soil by dust. A sample of ashed vegetation from the archive, that had no cork stopper, contained high concentrations of PCBs (78 ng/g), concentrations of mono- to tri-CDFs that were higher than in any of the soils (190 pg/g), but very low concentrations of Sigma (4-8)PCDD/F (12 pg/g). This pattern of analytes was considered to be representative of contamination from store room air and was completely different from the pattern observed in the soils. Taken together these observations indicate that contamination during storage, or subsequent handling, is unlikely to have occurred in archived soil samples that were stored with cork and wax seal intact. The results imply surface soil Sigma (4-8)PCDD/F concentrations of around 60 pg/g at Rothamsted (southeast England) in the late 1800s, compared with similar to 300 pg/g reported for rural UK soils in the 1990s.

Haas, H. L., E. C. Lamon, K. A. Rose and R. F. Shaw (2001). "Environmental and biological factors associated with the stage-specific abundance of brown shrimp (*Penaeus aztecus*) in Louisiana: applying a new combination of statistical techniques to long-term monitoring data." *Canadian Journal of Fisheries and Aquatic Sciences* **58**(11): 2258-2270. <Go to ISI>://000172266700016

Several short-term and small-scale correlative studies have associated brown shrimp (*Penaeus aztecus*) recruitment with high densities of sub-adults, high salinity, warm temperature, low river flow, and low precipitation. In this paper, we address criticisms of traditional correlative studies by using a spatially and temporally extensive dataset, by comparing stepwise multiple regression (SMR) to Bayesian model averaging (BMA), and by investigating nonlinear relationships with generalized additive models (GAMs). We use this combination of statistical methods to examine relationships between annual, stage-specific abundance estimates and environmental factors. BMA and SMR resulted in models with similar explanatory power, but BMA suggested fewer linear predictors. GAMs did not suggest nonlinear relationships among stage-specific abundance estimates. Postlarval abundance was not well described by any model. Juvenile abundance was partially described by environmental variables such as temperature, water clarity, and water level. Adult abundance was well described by early-juvenile abundance, salinity, and temperature. These results suggest that juvenile abundance may be the critical component in determining year-class strength of brown shrimp. Identifying mechanisms that regulate juvenile production within the estuary will be a critical step in effectively managing Louisiana's brown shrimp resource.

Halbach, M. D., U. Egert, J. Hescheler and K. Banach (2003). "Estimation of action potential changes from field potential recordings in multicellular mouse cardiac myocyte cultures." *Cellular Physiology and Biochemistry* **13**(5): 271-284. <Go to ISI>://000186416600004

Background: Extracellular recordings of electrical activity with substrate-integrated microelectrode arrays (MEAs) enable non-invasive long-term monitoring of contracting multicellular cardiac preparations. However, to characterize not only the spread of excitation and the conduction velocity from field potential (FP) recordings, a more rigorous analysis of FPs is necessary. Therefore in this study we aim to characterize intrinsic action potential (AP) parameters by simultaneous recording of APs and FPs. Methods: A MEA consisting of 60 substrate-integrated electrodes is used to record the FP-waveform from multicellular preparations of isolated embryonic mouse cardiomyocytes. Simultaneous current clamp recordings in the vicinity of individual microelectrodes and pharmacological interventions allowed us to correlate FP and AP components and their time course. Results: The experiments revealed a linear relationship between AP rise time and FP rise time as well as a linear relationship between AP duration and FP duration. Furthermore a direct contribution of the voltage dependent Na^+ - and Ca^{2+} current to the FP could be identified. Conclusion: The characterization of the FP allows us for the first time to estimate AP changes and the contribution of individual current components to the AP by the help of non-invasive recording within a multicellular cardiac preparation during long-term culture. Copyright (C) 2003 S Karger AG Basel.

Halldin, S., H. Bergstrom, D. Gustafsson, L. Dahlgren, P. Hjelm, L. C. Lundin, P. E. Mellander, T. Nord, P. E. Jansson, J. Seibert, M. Stahl, A. S. Kishne and A. S. Smedman (1999). "Continuous long-term measurements of soil-plant-atmosphere variables at an agricultural site." *Agricultural and Forest Meteorology* **98-9**: 75-102. <Go to ISI>://000085025900005

It is a major challenge in modern science to decrease the uncertainty in predictions of global climate change. One of the largest uncertainties in present-day global climate models resides with the understanding of processes in the soil-vegetation-atmosphere-transfer (SVAT) system. Continuous, long-term data are needed to correctly quantify balances of water, energy and CO_2 in this system and to correctly model them. It is the objective of this paper to demonstrate how a combined system of existing sensor, computer, and network technologies could be set up to provide continuous and reliable long-term SVAT-process data from an agricultural site under almost all weather conditions. A long-term climate-monitoring system within the framework of NOPEX was set up in 1993-1994 at the Marsta Meteorological Observatory (MMO). It is situated in a flat agricultural area where annual crops are cultivated on a heavy clay soil. It has successfully monitored relevant states and fluxes in the system, such as atmospheric fluxes of momentum, heat, water vapour and CO_2 , atmospheric profiles of wind speed, direction, and temperature, short- and long-wave radiation, soil temperature, soil-water contents, groundwater levels, and rainfall and snow depth. System uptime has been more than 90% for most of its components during the first 5 years of operation. Results from the first 5 years of operation has proven MMO to be an ideal site for intercomparison and intercalibration of radiometers and fast turbulence sensors, and for evaluation of other sensors, e.g., rain gauges. The long time series of radiation data have been valuable to establish numerical limits for a set of quality-control flags. MMO has served as a boundary-layer research station and results from NOPEX campaigns show how the dimensionless wind gradient depends not only on the traditional stability parameter z/L but also on the height of the convective boundary layer. Measurements at the observatory grounds and a neighbouring field show a considerable variability in surface properties, which must be accounted for when assessing budgets of heat and other scalars. Questions concerning long-term calibration plans, maintenance of sensors and data-collection system, and continuous development of the computer network to keep it up to date are, however, only partly of interest as a research project in itself. It is thus difficult to get it funded from usual research-funding agencies. The full value of data generated by the MMO system can best be appreciated after a decade or more of continuous operation. Main uses of the data would be to evaluate how SVAT models handle the natural variability of climate conditions, quantification of water, carbon and energy budgets during various weather conditions, and development of new parameterisation schemes in global and regional climate models. (C) 1999 Elsevier Science B.V. All rights reserved.

Hamalainen, H., H. Luotonen, E. Koskenniemi and P. Liljaniemi (2003). "Inter-annual variation in macroinvertebrate communities in a shallow forest lake in eastern Finland during 1990-2001." *Hydrobiologia* **506**(1-3): 389-397. <Go to ISI>://0001884455600052

As a part of the Integrated Monitoring (IM) Programme of Air Pollution Effects on Ecosystems, the macroinvertebrate community of a pristine forest lake was monitored from 1990 up to the present. Lake Iso Hietajarvi is a small and shallow, weakly stratified oligotrophic headwater lake situated in Patvinsuo National Park, eastern Finland. Benthic macroinvertebrates were sampled annually, once in autumn at depths of 3 - 4 m (sublittoral zone) and at 7 m (profundal zone). The water quality of the lake and meteorological characteristics in the area were monitored during the same period. The inter-annual variation in macroinvertebrate abundance and taxonomic composition in the lake unaffected by human activities is described, compared across depth zones and related to environmental variation. The annual variation in density and taxa richness was relatively small, being proportionately greater in the profundal zone. There was a

considerable year-to-year variation in the abundance of common and dominant taxa. Most taxa were always few in number and occurred only occasionally - in 1 or 2 years - in both depth zones. The inter-annual community persistence (constancy of taxa occurrences) and stability (consistency of relative abundance of taxa) as measured by the Sorensen distance, were however, relatively high and generally greater in the sublittoral zone. The patterns of variation in density, taxa richness, abundance of dominant taxa and community persistence and stability were generally different in the two zones compared, and few correlations with the measured environmental variables were found. Inter-annual stability and persistence, however, closely traced the course of wintertime North Atlantic Oscillation index, suggesting that the rate of local community change may be linked with large-scale climatic variation in a subtle way. The implications of the results are discussed in the context of biomonitoring.

Handy, R. D., T. S. Galloway and M. H. Depledge (2003). "A proposal for the use of biomarkers for the assessment of chronic pollution and in regulatory toxicology." *Ecotoxicology* **12**(1-4): 331-343.<Go to ISI>://000181129000028

Despite a wealth of information on biomarkers, they are not routinely used for regulatory purposes, even though the potential benefits of biomarkers to rationalise complex exposure-response relationships are clear. Biomarkers can be inappropriately applied or misinterpreted, because the fundamental assumptions in exposure-response relations have not been considered. Factors causing temporal and spatial variability in biomarker responses are reviewed. These include numerous geochemical and biotic variables. The variation can be minimised by appropriate study site selection, experimental replication, multivariate epidemiological approaches, normalised controls, and temporal calibration of responses; so that the regulatory use of biomarkers for biomonitoring and tracking pollution events, including chronic or multiple exposures to complex mixtures is possible. We propose and define the characteristics of biomarkers of chronic exposure or effect, which must measure changes in pollution/effect against long-term changes in other general stresses (disease, nutrition, environmental quality), relate to cumulative injury, and remain responsive over months or years. Neuroendocrine, immunological, and histological biomarkers are suggested for chronic pollution. We propose a regulatory framework for biomarkers based on a weight of evidence approach that can integrate biomarkers in risk assessment and long-term monitoring programmes.

Harman, I. T. and V. A. Drake (2004). "Insect monitoring radar: analytical time-domain algorithm for retrieving trajectory and target parameters." *Computers and Electronics in Agriculture* **43**(1): 23-41.<Go to ISI>://000220445100002

Automated radars employing the zenith-pointing linear-polarized conical-scan (ZLC) configuration are proving effective for long-term monitoring observations of the migratory activity of a number of insect pests of agriculture. An insect passing over one of these radars produces a signal with a rather complex time variation, which is recorded and subsequently analyzed to retrieve parameters indicative of the target's trajectory (speed, direction), its orientation, and its character (size, shape). As an alternative to earlier algorithms for retrieving these parameters, we present here a relatively straightforward analytical method that uses the form of the ZLC scan to isolate signal components in the time-domain and that allows the parameters to be estimated by a sequence of least-squares fits. Validation tests that indicate the algorithm's precision and accuracy are also described. While the algorithm can be used to determine a starting point for a subsequent overall fit of all parameters, its retrievals are of sufficient quality for this final stage to be unnecessary in the envisaged applications. The algorithm has been adapted successfully for routine processing of data from two insect monitoring radars (IMRs) deployed in inland eastern Australia; implemented in the C++ language and running on a modest microcomputer, it processes the similar to 50,000 echoes recorded on the nights of most intense migration in similar to 4 min. (C) 2003 Elsevier B.V. All rights reserved.

Hassanin, A., A. E. Johnston, G. O. Thomas and K. C. Jones (2005). "Time trends of atmospheric PBDEs inferred from archived UK herbage." *Environmental Science & Technology* **39**(8): 2436-2441.<Go to ISI>://000228428900009

Aerial portions of vegetation receive the bulk of their burden of persistent organic pollutants (POPs) from the atmosphere. Vegetation can therefore be a useful indicator of the changing atmospheric burden of POPs. Samples of archived pasture, collected from Rothamsted Experimental Station in the United Kingdom between 1930 and 2004, were analyzed for a range of polybrominated diphenyl ethers (PBDEs). PBDEs could not be routinely detected in the pre-1970 samples. Thereafter, the dominant congeners BDE 28, 47, 49, 99, 100, 153, 154, and 183 were frequently detected. The general trend was (a) a rise through the 1970s; (b) a minipeak in the mid-1980s, strongly influenced by one particularly high sample for 1984; (c) values remaining high through the late 1980s/1990s; (d) an indication of a more recent decline for all congeners (except BDE-28), consistent with recent restrictions on PBDE usage in Europe. These trends were compared to recent modeled estimates of U.K. PBDE emissions. The congener profiles of technical mixtures, U.K. air, soil, and pasture were compared and shown to be broadly similar. The implications for environmental release mechanisms are discussed.

Hauck, C. (2002). "Frozen ground monitoring using DC resistivity tomography." *Geophysical Research Letters* **29**(21): art. no.-2016.<Go to ISI>://000180611900012

Time-lapse DC resistivity tomography is shown to be a useful method for permafrost and frozen ground monitoring in high-mountain areas. Resistivity changes are related to freezing and thawing processes and monitor the permafrost evolution over monthly to seasonal time scales. A fixed-electrode array allows measurements independent of the snow cover thickness. The 2-dimensional tomographic approach yields information about spatially variable transient processes, such as the advance and retreat of freezing fronts. In combination with borehole temperature data, differences in total water content at different depths could be estimated. In addition, the temporal evolution of the unfrozen water content was calculated showing a strong decrease during the winter months in the near-surface layer and a quasi-sinusoidal behaviour at greater depths. This approach seems promising for future long-term monitoring programmes of the permafrost evolution at low cost.

Havstad, K. M. and J. E. Herrick (2003). "Long-term ecological monitoring." *Arid Land Research and Management* **17**(4): 389-400.<Go to ISI>://000185732900008

The intent of long-term ecological monitoring is to document changes in important properties of biological communities. At the least, a long-term monitoring system should be designed to detect long-term trends in three key attributes: soil and site stability, hydrologic function, and the biotic integrity of the system. There are four basic guidelines for developing

integrated soil-vegetation monitoring systems for rangelands. These are: (1) identifying a suite of indicators which are consistently correlated with the functional status of one or more critical ecosystem processes and/or properties; (2) selecting base indicators on site specific objectives and resource concerns, and inherent soil and site characteristics; (3) using spatial variability in developing and interpreting indicators to make them more representative of ecological processes; and (4) interpreting indicators in the context of an understanding of dynamic, nonlinear ecological processes. To the extent possible, indicators should reflect early changes in ecological processes and indicate that a more significant change is likely to occur. In addition to these guidelines, measurements included in long-term monitoring systems should be rapidly applied, simple to understand, inexpensive to use, and quantitatively repeatable.

Haygarth, P. M., A. I. Cooke, K. C. Jones, A. F. Harrison and A. E. Johnston (1993). "Long-Term Change in the Biogeochemical Cycling of Atmospheric Selenium - Deposition to Plants and Soil." *Journal of Geophysical Research-Atmospheres* **98**(D9): 16769-16776. <Go to ISI>://A1993LY33000016

Retrospective analysis of archived soil and herbage samples from Rothamsted Experimental Station, southeast England, has determined the long-term changes in selenium deposition over the last century. Three out of four soils (those under permanent grassland, or growing wheat and barley) accumulated Se at a rate of circa 0.15% yr⁻¹ (rate based on Se concentration, normalized to the earliest date circa 100 years earlier), with a net flux in the order 60-90 µg m⁻² yr⁻¹. The increase in soil growing root crops was smaller, with an increase of only 0.07% yr⁻¹, possibly reflecting larger volatilization losses from this soil. Herbage samples were sensitive to changes in air composition. In the earlier half of the twentieth century there was an increase in the selenium content of herbage, probably from increased atmospheric deposition following increased use of fossil fuels. However, following the Clean Air Act (1956) the atmospheric loading of Se at this UK site appears to have declined, with contemporary Se concentrations in herbage considerably lower than they were in the 1970s, probably reflecting a change in fossil fuel usage from coal to oil and gas. The atmosphere has been a significant source of Se to plants and therefore grazing livestock. If the decline in the atmospheric input of selenium to herbage continues, selenium deficiency in livestock may become more prevalent in areas where soil concentrations are marginal.

Hegg, O. (1984). "Longterm-Influence of Fertilization on Some Species of the Nardetum at the Schynige Platte above Interlaken." *Angewandte Botanik* **58**(2): 141-145. <Go to ISI>://A1984TV09300004

Hengeveld, R. (1995). *Assessing Invasion Risk*. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press. pp 85-106

Holmes, M. D., A. N. Miles, C. B. Dodrill, G. A. Ojemann and A. J. Wilensky (2003). "Identifying potential surgical candidates in patients with evidence of bitemporal epilepsy." *Epilepsia* **44**(8): 1075-1079. <Go to ISI>://00018459000011

Purpose: To determine which patients with evidence of medically refractory bitemporal epilepsy are potentially good candidates for surgical therapy. Methods: We reviewed 42 adults with intractable seizures who were found to have bitemporal ictal onsets, based on scalp video-EEG long-term monitoring (LTM). All underwent invasive LTM before surgery. Surgical outcomes were classified as seizure free, >75% reduction in seizures, or <75% reduction in seizures, greater than or equal to 1 year after resection. We related the following factors to outcome: (a) > 75% preponderance of interictal scalp EEG discharges to one temporal region; (b) magnetic resonance imaging (MRI) findings; (c) lateralizing deficits on verbal or visual reproduction memory testing; and (d) memory failure with injection contralateral to side of surgery on Wada testing. Results: Twenty-six (62%) of 42 patients had unilateral ictal onsets based on intracranial studies. Seizure freedom (occurring in 64% of this group), or >75% seizure reduction (found in 12% of subjects) occurred only when at least one of the following three factors was concordant with the side of surgery: preponderance of interictal scalp EEG discharges, unilateral temporal lesion on MRI, or lateralizing verbal or visual reproduction memory deficits on neuropsychological tests (p = 0.004). Seven subjects with bilateral ictal onsets based on intracranial studies had resections based on preponderance of seizures to one side, or other lateralizing noninvasive abnormality. Five of these (all of whom had greater than or equal to 80% of seizures originating from one side) had >75% reduction in seizures. Conclusions: Invasive monitoring to pursue possible surgical therapy for patients with surface EEG evidence of bitemporal epilepsy may be justified only when some lateralizing feature is found in other noninvasive assessments. Key Words: Temporal lobe epilepsy-Epilepsy surgery-Intractable seizures-Longterm monitoring.

Hommel, B. and B. Pallutt (2002). "Evaluation of herbicide resistance against glufosinate in oilseed rape and maize in view of integrated plant protection - results of a long-term field experiment started in 1996 with a special view on field flora." *Zeitschrift Fur Pflanzenkrankheiten Und Pflanzenschutz-Journal of Plant Diseases and Protection*: 985-994. <Go to ISI>://000202836900128

With the cultivation of herbicide resistant crops and the application of relevant herbicides, changes in the field flora are controversially discussed. From that, parameters for the monitoring of transgenic herbicide resistant crops have been derived. Present results have shown as expected that the use of the relevant herbicide LIBERTY has not yet reduced biodiversity in the field flora. New emerged weeds in maize after herbicide application have been evaluated as an ecological relevant aspect. For statements about the selection of less sensitive weeds, the experimental period is still too short, although herbicide resistant crops were grown every second year. Control of volunteer rape in glufosinate resistant maize was not necessary so far. The problem with volunteers should be prevented by avoiding further herbicide resistant crops grown in a crop rotation with the same herbicide resistance like rape. Case specific parameters for the monitoring are proposed.

Hostert, P., A. Roder and J. Hill (2003). "Coupling spectral unmixing and trend analysis for monitoring of long-term vegetation dynamics in Mediterranean rangelands." *Remote Sensing of Environment* **87**(2-3): 183-197. <Go to ISI>://000186447400006

The development of vegetation cover is one of the primary indicators for land degradation, stability, or regeneration in regions threatened by overgrazing. This paper addresses the problem how spatially explicit information about degradation processes in European Mediterranean rangelands can be derived from long time series of satellite data. The selected test site in central Crete, Greece, is considered to be representative for the highly heterogeneous character of such landscapes. The monitoring approach comprises the time period between 1977 and 1996, covered by nine Landsat TM

and four Landsat MSS images. Special emphasis has hence been put on the evaluation of potentials and drawbacks when coupling Landsat TM and MSS based results. The data sets were geometrically and radiometrically pre-processed in a rigorous fashion, followed by a linear spectral unmixing approach and a time series analysis of vegetation fraction images. Based on the resulting map, the spatio-temporal patterns of vegetation cover changes are explained. Even a test site such as central Crete, with its limited spatial extend, exhibits heterogeneous patterns of change, supporting the hypothesis that long time series of EOS data from Landsat-like sensors are mandatory to identify the relevant changes at landscape level. (C) 2003 Elsevier Inc. All rights reserved.

Hunt, B. P. V. and G. W. Hosie (2003). "The Continuous Plankton Recorder in the Southern Ocean: a comparative analysis of zooplankton communities sampled by the CPR and vertical net hauls along 140 degrees E." Journal of Plankton Research **25**(12): 1561-1579. <Go to ISI>://000187232500010

A repeat transect was run south of Tasmania, along similar to 140 degrees E, during November and December 2001. NORPAC nets were deployed during a CTD transect on the southern leg, sampling four depth zones at each of 19 stations: 0-20, 20-50, 50-100 and 100-150 m. A Continuous Plankton Recorder (CPR) was deployed on the northern leg (average sampling depth = 10.5 m). Both net systems were harnessed with 270 µm mesh and all sampling was conducted between 47 degrees S and the Southern Polar Front (S-PF) at similar to 61 degrees S. Zooplankton in the top 150 m of the water column demonstrated strong, small-scale, vertical distribution patterns. Species richness and diversity increased with depth, and were lowest for CPR samples. Conversely, dominance decreased with depth and was highest for CPR samples. Evenness was similar for all sample groups, indicating that all communities had a similar distribution of abundance amongst species. There was little variation in abundance between NORPAC depth zones (average = 82 +/- 47 individuals m⁻³), while abundance was substantially higher in the CPR samples (average = 144 +/- 103 individuals m⁻³), despite it under-sampling fast-moving and delicate components of the plankton community. The higher CPR abundance was due to significantly higher abundance levels of Appendicularia, *Oithona similis* and *Rhincalanus gigas* nauplii. The NORPAC samples showed that these three taxa were most abundant in the surface waters. The significant increase in abundance in the CPR samples was attributed to the growth in size during the period between the NORPAC and CPR surveys (minimum 15 days) increasing their catchability. Both the NORPAC nets and CPR surveys identified distinct communities to the north and south of the Southern Sub-Antarctic Front. Owing to its shallow towing depth, the CPR focuses on species with surface distributions. Despite under-sampling some components of the zooplankton, the CPR provided sufficient taxonomic resolution to identify biogeographic zones in the Southern Ocean. The utility of the CPR as a long-term monitoring tool in the Southern Ocean is discussed.

Isensee, A. R. and A. M. Sadeghi (1995). "Long-Term Effect of Tillage and Rainfall on Herbicide Leaching to Shallow Groundwater." Chemosphere **30**(4): 671-685. <Go to ISI>://A1995QK01600007

The interaction of conventional tillage (CT) and no-tillage (NT) crop production practices with rainfall on the movement of three herbicides into shallow groundwater was evaluated over 4 yr. Groundwater was sampled from unconfined (<1.5 m deep) and confined (<3 m and 4.5 to 11 m deep) monitoring wells in 1989-1992 and analyzed for atrazine, alachlor, and cyanazine. Pesticide concentrations were cyclical: residues were highest soon after application, declined during the growing season, then increased during winter recharge. Alachlor and cyanazine were at nondetectable levels within 3 mo after application. Atrazine residues, present in confined groundwater all year, ranged in concentration between 0.03 to 1.9 and 0.16 to 3.7 µg L⁻¹ for the CT and NT plots, respectively. Herbicide residues were higher in unconfined (<1.5 m deep) than confined (<3 m deep) groundwater. Atrazine was sporadically detected in groundwater to 4.6 m, but not deeper. Lateral transport in confined groundwater to untreated areas was evident. The rapid movement of herbicides to groundwater with the first major rain after application suggest that preferential transport may be common. Results of this study also indicate that timing, amount and intensity of rainfall relative to pesticide application may be the primary factors governing pesticide leaching.

Jauffret, S. and S. Lavorel (2003). "Are plant functional types relevant to describe degradation in arid, southern Tunisian steppes?" Journal of Vegetation Science **14**(3): 399-408. <Go to ISI>://000184495400010

In the Tunisian and zone disturbances (e.g. overgrazing and agriculture) and stresses (e.g. aridity, low fertility) drive changes in the structure and functioning of rangelands, with a decrease in perennial plant cover, changes in floristic composition and erosion. Long-term monitoring requires (1) an understanding of the dynamics of vegetation change and associated ecological processes and (2) identification of relevant indicators. Using data from the arid zone of southern Tunisia we tested the hypothesis that plant functional response types could be used to address these two goals. We identified plant functional response types in response to a gradient of soil and vegetation types characterized by changes in perennial plant cover, dominant species and associated soil types. Vegetation samples were stratified by contrasted vegetation patch types with varying perennial plant cover (1.6 to 22%). We focused our analysis of trait responses within dwarf-shrubs, which are the dominants in typical steppe ecosystems of south Tunisia. Available trait data concerned morphology (plant height, leaf type), regeneration (dispersal mode, phenology and regeneration mode) and grazing value. Although we found it difficult to recognize 'indicator response types' that could be used directly to monitor changes in community composition, we were able to identify plant response syndromes that are relevant to long-term vegetation changes, and in particular degradation processes, in the region. Two main response types were identified: the decrease type, made up of small or medium chamaephytes with high grazing palatability and the increase type with medium to tall chamaephytes and low grazing palatability. These response types are proposed as key elements in a state-and-transition model of vegetation dynamics in the context of agropastoral disturbances and climatic and edaphic stresses.

Johnson, K. S. and L. J. Coletti (2002). "In situ ultraviolet spectrophotometry for high resolution and long-term monitoring of nitrate, bromide and bisulfide in the ocean." Deep-Sea Research Part I-Oceanographic Research Papers **49**(7): 1291-1305. <Go to ISI>://00017777900010

The design for an in situ ultraviolet spectrophotometer (ISUS) that can operate while submerged to depths of at least 2000 m is reported. We show that the ISUS can be used to make high resolution (similar to 1/s and 0.5 cm) and long-term (> 3 months) measurements of the concentration of nitrate, bisulfide and bromide in seawater using the distinctive, ultraviolet absorption spectra of these chemical species. The precision, accuracy and stability of the chemical concentrations derived

with the ISUS are sufficient for many biogeochemical studies. One standard deviation of the nitrate concentration in seawater is similar to 0.5 μM and the limit of detection (3 SD) for one observation would be similar to 1.5 μM . However, the noise is nearly random and significant reductions in the detection limit are possible by averaging multiple observations. The 95% confidence interval for a 30s scan is 0.2 μM . Low temperatures appear to produce a bias (similar to 10% at 400 m depth in the ocean) in the nitrate concentration and in the salinity estimated from the bromide concentration. If an independent estimate of salinity is available, then the bias in nitrate can be eliminated by correcting nitrate concentrations by the same amount that the optical estimate of salinity is in error. The instrument has been deployed on a mooring in the equatorial Pacific for a 6-month period with no apparent degradation in performance during the first 3 months.

Measurements of UV spectra at a height of 1 cm over the bottom in a cold seep at 960 m depth demonstrate the capability to detect bisulfide ion within the benthic boundary layer. (C) 2002 Elsevier Science Ltd. All rights reserved.

Johnston, A. E. (1976). "Some Factors Affecting Crop Response to Soil-Phosphorus." Journal of the Science of Food and Agriculture **27**(6): 590-590.<Go to ISI>://A1976BV45300014

Johnston, A. E., K. W. T. Goulding and P. R. Poulton (1986). "Soil Acidification During More Than 100 Years under Permanent Grassland and Woodland at Rothamsted." Soil Use and Management **2**(1): 3-10.<Go to ISI>://A1986A775400001

Johnston, A. E., P. W. Lane, G. E. G. Mattingly, P. R. Poulton and M. V. Hewitt (1986). "Effects of Soil and Fertilizer-P on Yields of Potatoes, Sugar-Beet, Barley and Winter-Wheat on a Sandy Clay Loam Soil at Saxmundham, Suffolk." Journal of Agricultural Science **106**: 155-167.<Go to ISI>://A1986A234900024

Johnston, A. E. and G. E. G. Mattingly (1976). "Experiments on Continuous Growth of Arable Crops at Rothamsted and Woburn-Experimental-Stations - Effects of Treatments on Crop Yields and Soil Analyses and Recent Modifications in Purpose and Design." Annales Agronomiques **27**(5-6): 927-956.<Go to ISI>://A1976DN70300024

Johnston, A. E., P. R. Poulton and P. Lane (1986). "Modeling the Long-Term Residual Effects of Phosphorus Residues in Soil." Journal of the Science of Food and Agriculture **37**(1): 8-8.<Go to ISI>://A1986AZF4300002

Jonathan, M. P., V. Ram-Mohan and S. Srinivasalu (2004). "Geochemical variations of major and trace elements in recent sediments, off the Gulf of Mannar, the southeast coast of India." Environmental Geology **45**(4): 466-480.<Go to ISI>://000188493500004

The Gulf of Mannar along the Tuticorin coast is a coral base of the southeast coast of India. To obtain a preliminary view of its environmental conditions, geochemical distribution of major elements (Si, Al, Fe, Ca, Mg, Na, K, P), trace elements (Mn, Cr, Cu, Ni, Co, Pb, Zn, Cd) and acid leachable elements (Fe, Mn, Cr, Cu, Ni, Co, Pb, Zn, Cd) were analyzed in surface sediment samples from two seasons. Geochemical fractionation confirmed the lithogenic origin of metals, which were mainly associated with the detrital phase. The sediments in the gulf are sandy with abundant calcareous debris, which controls the distribution of total and acid leachable elements. Enrichment factors relative to crust vary by a magnitude of two to three and the presence of trace metals indicates the input of Cr, Pb, Cd, Cu and Zn in both forms through industrial activities. Factor analysis supports the above observation with higher loadings on acid leachable elements and its association with CaCO_3 . The increase in concentration of trace metals (Cr, Pb, Cd, Cu, Co, Ni, Zn) along the Gulf of Mannar indicates that the area has been contaminated by the input from riverine sources and the industries nearby. The present study indicates that other sources should be evaluated in the long-term monitoring program.

Jones, K. C., A. Jackson and A. E. Johnston (1992). "Evidence for an Increase in the Cadmium Content of Herbage since the 1860s." Environmental Science & Technology **26**(4): 834-836.<Go to ISI>://A1992HL93600033

Jones, K. C., A. E. Johnston and S. P. McGrath (1995). "The Importance of Long-Term and Short-Term Air Soil Exchanges of Organic Contaminants." International Journal of Environmental Analytical Chemistry **59**(2-4): 167-178.<Go to ISI>://A1995QZ41200008

Retrospective analysis of archived soil samples collected and stored from long-term agricultural experiments in the UK has shown how soil organic chemical composition has changed over time. High molecular weight polycyclic aromatic hydrocarbons (e.g. benzo[a]pyrene) and polychlorinated dibenzo-p-dioxins and -furans have increased in concentration through this century as a result of cumulative atmospheric depositional inputs. Concentrations of polychlorinated biphenyls and low molecular weight hydrocarbons (e.g. phenanthrene) peaked in the late 1960s/early 1970s, but have declined subsequently. This reflects declining atmospheric inputs of these compounds and losses from surface soils by volatilisation back to the atmosphere and biodegradation. PCBs and low molecular weight PAHs exist predominantly in the vapour phase in air, whilst heavy PAHs and PCDD/Fs are predominantly particulate-bound. Outgassing from soils is probably the most important contemporary source of PCBs to the atmosphere in the UK. Future UK PCB air concentrations will presumably therefore be influenced (controlled) by the rate of desorption and outgassing, as soil and air concentrations move towards a condition of equilibrium partitioning. Archived soils collected and stored before the commercial manufacture of PCBs contain no PCBs indicating that there is no 'natural production' of these compounds. However, within a few hours of exposure to contemporary air these samples contain detectable quantities of PCBs. Short-term air-soil exchange, such as during soil drying in the laboratory, can lead to contamination of samples which contain low concentrations of PCBs and loss from samples which contain high concentrations.

Jones, K. C., G. Sanders, S. R. Wild, V. Burnett and A. E. Johnston (1992). "Evidence for a Decline of Pcb's and Pah's in Rural Vegetation and Air in the United-Kingdom." Nature **356**(6365): 137-140.<Go to ISI>://A1992HH73100053

RELIABLE data on persistent organic contaminants in the environment are needed to evaluate strategies to limit their dispersal. Long-term data are often not available, however, because the chemicals in question were not routinely analysed in the past. Although attempts have been made to assess temporal trends by analysis of environmental samples deposited in discrete or identifiable layers (in sediment or peat cores) 1-3, these media may be disturbed in situ or give poor temporal resolution, or the contaminants may be subject to post-depositional changes. Polychlorinated biphenyls (PCBs) and

polyaromatic hydrocarbons (PAHs) are persistent and toxic 4-9 contaminants for which no long-term global ambient monitoring data exist. Plant foliage is a reliable monitor of ambient levels of vapour-phase compounds in air 10-16 and here we present an analysis of archived herbage samples (1965-89) which shows that air concentrations of lower chlorinated PCBs in rural England have decreased by up to a factor of 50 between 1965-69 and 1985-89. High-molecular-weight PCBs and PAHs have also decreased in concentration, but not to such a great extent.

Jones, K. C., C. Symon, P. J. L. Taylor, J. Walsh and A. E. Johnston (1991). "Evidence for a Decline in Rural Herbage Lead Levels in the UK." *Atmospheric Environment Part a-General Topics* **25**(2): 361-369.<Go to ISI>://A1991EZ97500017

Samples of herbage collected from field plots at Rothamsted Experimental Station in southeast England between 1956 and 1988 have been analyzed for Pb. Changes in atmospheric deposition of Pb, identified as the major source of foliar Pb, resulted in temporal trends in the Pb concentrations of the herbage. Annual herbage Pb concentrations at Rothamsted correlated with the trend in annual U.K. air Pb over the years for which air data were available (1972-1988). This study provides evidence for a gradual reduction in herbage Pb concentrations during the study period, and of a recent, sharper decline following the reduction of petrol Pb at the beginning of 1986.

Jones, M. J. and M. Singh (2000). "Long-term yield patterns in barley-based cropping systems in Northern Syria. 2. The role of feed legumes." *Journal of Agricultural Science* **135**: 237-249.<Go to ISI>://000165454400003

Rotations of barley with feed legumes produce more biomass and crude protein than barley-fallow and continuous barley sequences, but scope remains to improve the potential value to farmers of feed legume-based systems. This paper summarizes 2-year results from two sites from 2-year rotations of barley with: narbon vetch (*Vicia narbonensis*) and lathyrus (*Lathyrus sativus*), each harvested mature; and common vetch (*Vicia sativa*), harvested by simulated green-grazing and mature, all in factorial combination with four NP fertilizer regimes applied biennially to the barley. Mean yield differences between rotations were quite small, but at the drier site the narbon vetch rotation was significantly superior in both total biomass and crop total nitrogen. Other results implied yield compensation between barley and legume phases: barley performance was relatively depressed at the wetter site after high-yielding narbon vetch but was relatively enhanced at both sites after green-grazed common vetch. Evidence from year-round soil-water monitoring suggests that the benefit following green grazing may have arisen, in part, from a small carry-over of profile moisture between crops not much inferior to that residual from a fallow year. Both crop phases responded strongly to biennial P fertilizer, and barley responded strongly to three rates of N-fertilizer, but a sometimes significant curvilinear component to this response reflected a tendency for grain yields to be depressed by added nitrogen in the driest years. But interactions between N-rates and rotations were not significant. It was concluded that narbon vetch may have greater potential than common vetch and lathyrus for mature harvest in drier areas, but its unsuitability for grazing green is a limitation. Flexibility of utilization is important, to accommodate the needs of different farmers and the exigencies of different seasons. The green-graze option has major potential where there is a demand for high-quality spring grazing; and indications that barley may be as productive after green-grazed vetch as after a year of fallow suggest an alternative approach for farmers who have previously avoided legumes in order to maximize barley production.

Jonsson, U., U. Rosengren, B. Nihlgard and G. Thelin (2002). "A comparative study of two methods for determination of pH, exchangeable base cations, and aluminum." *Communications in Soil Science and Plant Analysis* **33**(19-20): 3809-3824

The ability to compare soil chemical data achieved by different chemical extraction methods is a necessity for an efficient long-term monitoring of soils and for comparisons of results from regional soil surveys with differing standard methods. This study compares two common, methods for analysis of soil chemical properties, the combination of soil extraction in 1.0 M NH₄Cl and 1.0 M KCl and the single extraction method using 0.1 M BaCl₂. Results show that the two methods do not differ in extraction capability with regard to pH and exchangeable calcium (Ca) and magnesium (Mg). However, there is less agreement in extraction capability with regard to potassium (K), sodium (Na), and aluminum (Al). For these elements, BaCl₂ is less efficient than NH₄Cl and KCl. Despite the differences in extraction capability between BaCl₂ and KCl/NH₄Cl, regression analyses showed that the methods are well correlated (high regression coefficients for all, elements). Thus, transformation of data achieved by one method to estimated values of the other method are possible. Results from this study may be an important tool for comparisons of mineral soil data achieved by the two methods.

Kachur, A. N., V. S. Arzhanova, P. V. Yelptevsky, M. C. von Braun and I. H. von Lindern (2003). "Environmental conditions in the Rudnaya River watershed - a compilation of Soviet and post-Soviet era sampling around a lead smelter in the Russian Far East." *Science of the Total Environment* **303**(1-2): 171-185.<Go to ISI>://000181482700011

The Rudnaya River valley in the Russian Far East contains a rich reserve of lead, zinc and boron and has been mined for nearly 100 years. Environmental contamination related to the area's mines and lead smelter was studied for over 30 years during the Soviet era, by members of the Pacific Geographic Institute (PGI). Due to government restrictions, much of the sampling focused on contamination of the river, the air, forests, vegetation, agricultural products and soil. Source-specific samples, such as stack emissions from the smelter, and blood lead levels from the residents and smelter workers could not be obtained or were classified as State secrets. However, the data do describe the extent and severity of the environmental contamination and related public health concerns. Water discharged from the smelter averages 2900 m³/day (containing 100 kg of lead (Pb) and 20 kg of arsenic (As)) and leachate from area mine dumps and other industrial processes contaminates the Rudnaya River. Annual air emissions include 85 tonnes of particulates (containing 50 tonnes of Pb and 0.5 tonnes of As) and 250 000 m³ of gases high in sulfur dioxide (SO₂) carbon monoxide (CO) and carbon dioxide (CO₂). Vegetative stress is severe and much of this area is denuded. Pb and other metals in agricultural products suggest local produce may be dangerous for human consumption, although it is a major food source for the community. Public and occupational health indicators of basophilic stippling, respiratory disease and hair lead levels further suggest the severity of the problem. Although, descriptions of complete methodologies and procedures are often lacking, these data describe how sampling was conducted during the Soviet era and document a site with severe heavy metals contamination, especially lead, and the likelihood of related public health problems. They are relevant today as investigators employ state-of-the-art-sampling techniques and explore cleanup options under a new governmental system and challenging economic times. In the post-Soviet era, a Russian/US team sampled area soils and dusts and confirmed the severity of the environmental problems using commonly employed sampling and analysis techniques. Lead

concentrations in residential gardens (476-4310 mg/kg, G (x) over bar =1626mg/kg) and in roadside soils (2020-22900 mg/kg, G (x) over bar= 4420 mg/kg) exceed USEPA guidance for remediation. Preliminary biokinetic estimates of mean blood levels (average 13-27 mug/dl) suggest pre-school children are at significant risk of lead poisoning from soil/dust ingestion. Today, the PGI, in cooperation with the industrial owners and the local health and environmental authorities, is attempting to establish long-term monitoring and pollution abatement within the constraints of their difficult economic situation. (C) 2002 Elsevier Science B.V. All rights reserved.

Keizer, J. P., K. T. B. MacQuarrie, P. H. Milburn, K. V. McCully, R. R. King and E. J. Embleton (2001). "Long-term ground water quality impacts from the use of hexazinone for the commercial production of lowbush blueberries." Ground Water Monitoring and Remediation **21**(3): 128-135.<Go to ISI>://000170679500010

Lowbush blueberries, native to eastern Canada and Maine, are an important economic crop in these areas. Herbicides containing the active ingredient hexazinone are commonly applied to blueberry fields, and there is a high frequency of detection of relatively low concentrations of hexazinone in domestic wells located close to areas of lowbush blueberry production. The objective of this study was to determine the long-term impacts from hexazinone-based herbicide use on ground water quality in the immediate growing areas. Physical and chemical hydrogeologic data were collected for an outwash sand and gravel aquifer in southwestern New Brunswick, Canada. The majority of the land overlying the aquifer is devoted to lowbush blueberry production. Twenty-one nested monitoring wells were sampled for hexazinone and hexazinone metabolites over a four-year period. Hexazinone was consistently detected at values of 1 to 8 parts per billion (ppb) in all but two of these wells, one that is upgradient of herbicide applications, and one that is downgradient with anoxic conditions. Hexazinone metabolites B and AI were also detected in all but two of the 21 wells at values ranging from 0.5 to 2.5 ppb. The hexazinone and metabolite data suggest both aerobic and anaerobic degradation of hexazinone. Complete degradation of hexazinone appears to occur only in the one downgradient well exhibiting anoxic ground water conditions. Concentrations of hexazinone and its metabolites in the ground water were essentially constant over the four-year period.

Kim, C. H. (2004). "Conservation status of the endemic fern *Mankyua chejuense* (Ophioglossaceae) on Cheju Island, Republic of Korea." Oryx **38**(2): 217-219.<Go to ISI>://000221639400024

Mankyua chejuense, a fern endemic to Cheju Island, Republic of Korea, which lies 120 km south of the Korean Peninsula, appears to be restricted to five extant subpopulations in the north-east of the Island, with a total population of c. 1,300 individuals. Major threats to the existence of the species include shifting cultivation, plantation, overuse of basaltic rocks that are part of the species' microhabitat, farming and pasturage, and the construction of roads and golf courses in lowland areas. The information currently available for the species indicates that it should be categorized as Critically Endangered on the IUCN Red List. For conservation of the species it needs to be included on the national threatened species list, and its habitat designated as an ecological reserve. Intensive surveys are required in order to establish whether there are any other extant subpopulations of the species, and the presently known subpopulations require long-term monitoring and continuous protection.

Kimman, T. G. (1995). Potential long term ecological effects of the application of genetically engineered vaccines. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press.pp 183-195

Kitazato, H., T. Nakatsuka, M. Shimanaga, J. Kanda, W. Soh, Y. Kato, Y. Okada, A. Yamaoka, T. Masuzawa, K. Suzuki and Y. Shirayama (2003). "Long-term monitoring of the sedimentary processes in the central part of Sagami Bay, Japan: rationale, logistics and overview of results." Progress in Oceanography **57**(1): 3-16.<Go to ISI>://000183595900002

Deep-sea benthic ecosystems are mainly sustained by sinking organic materials that are produced in the euphotic zone. "Benthic-pelagic coupling" is the key to understanding both material cycles and benthic ecology in deep-sea environments, in particular in topographically flat open oceanic settings. However, it remains unclear whether "benthic-pelagic coupling" exists in eutrophic deep-sea environments at the ocean margins where areas of undulating and steep bottom topography are partly closely surrounded by land. Land-locked deep-sea settings may be characterized by different particle behaviors both in the water column and in relation to submarine topography. Mechanisms of particle accumulation may be different from those found in open ocean sedimentary systems. An interdisciplinary programme, "Project Sagami", was carried out to understand seasonal carbon cycling in a eutrophic deep-sea environment (Sagami Bay) with steep bottom topography along the western margin of the Pacific, off central Japan. We collected data from ocean color photographs obtained using a sea observation satellite, surface water samples, hydrographic casts with turbidity sensor, sediment trap moorings and multiple core samplings at a permanent station in the central part of Sagami Bay between 1997 and 1998. Bottom nepheloid layers were also observed in video images recorded at a real-time, sea-floor observatory off Hatsushima in Sagami Bay. Distinct spring blooms were observed during mid-February through May in 1997. Mass flux deposited in sediment traps did not show a distinct spring bloom signal because of the influence of resuspended materials. However, dense clouds of suspended particles were observed only in the spring in the benthic nepheloid layer. This phenomenon corresponds well to the increased deposition of phytodetritus after the spring bloom. A phytodetrital layer started to form on the sediment surface about two weeks after the start of the spring bloom. Chlorophyll-a was detected in the top 2 cm of the sediment only when a phytodetritus layer was present. Protozoan and metazoan meiobenthos increased in density after phytodetritus deposition. Thus, "benthic-pelagic coupling" was certainly observed even in a marginal ocean environment with undulated bottom topography. Seasonal changes in features of the sediment-water interface were also documented. (C) 2003 Elsevier Science Ltd. All rights reserved.

Kjellander, P., A. J. M. Hewison, O. Liberg, J. M. Angibault, E. Bideau and B. Cargnelutti (2004). "Experimental evidence for density-dependence of home-range size in roe deer (*Capreolus capreolus* L.): a comparison of two long-term studies." Oecologia **139**(3): 478-485.<Go to ISI>://000221056400019

The effect of experimental manipulation of population density on home-range size was investigated in two free-ranging roe deer (*Capreolus capreolus*) populations under contrasting environmental conditions. In these two long-term monitoring studies, one in Bogesund, Sweden (12 years) and one in Dourdan, France (10 years), deer density varied fourfold through

varying culling pressure. Home-range data were collected by radio-tracking across the periods of contrasting density of the studies. We predicted that home-range size for females should vary in relation to the level of feeding competition, while for males, competition for mating opportunities should also influence range size, at least in summer when roe bucks are territorial. We found a highly consistent pattern over the two populations, with strong effects of deer density on home-range size, as well as significant differences between winter and summer ranges and between the sexes. Home ranges were consistently smaller at high density compared to low density. Males had larger ranges than females and this was particularly so during summer. Lastly, winter ranges were generally larger than summer ranges, particularly among females, although males at Dourdan had larger summer ranges compared to winter ranges. We suggest that the reduction of range size at high deer density during winter, as well as summer, is linked to the solitary behaviour and territorial social system of roe deer, with possible effects of dominance rank, even outside the mating season.

Kjeller, L. O., K. C. Jones, A. E. Johnston and C. Rappe (1996). "Evidence for a decline in atmospheric emissions of PCDD/Fs in the UK." *Environmental Science & Technology* **30**(4): 1398-1403.<Go to ISI>://A1996UC41300068

Komarkova, J., O. Komarek and J. Hejzlar (2003). "Evaluation of the long term monitoring of phytoplankton assemblages in a canyon-shape reservoir using multivariate statistical methods." *Hydrobiologia* **504**(1-3): 143-157.<Go to ISI>://000188316100015
Long term monitoring of the Rimov Reservoir provided a data set for the analysis of phytoplankton composition and biomass in coincidence with physical, chemical, hydrological and biotic factors. Data from 15 years of monitoring (1984 and 1998) were statistically processed using the CANOCO software. The distribution of dominant species and whole assemblages among three ordination axes were analyzed indirectly by detrended correspondence analysis (DCA). The relationships between the species and the environmental factors were studied by canonical correspondence analysis (CCA) with special attention to the seasons. Statistical analysis specified only two types of phytoplankton assemblages interchanging each year: a cold assemblage in winter and spring and a warm assemblage in summer and fall. The transition period was a 'clear-water' period. Species composition and phytoplankton biomass of the warm assemblage are the most important variables for drinking water reservoirs, especially for the Rimov reservoir. The appearance of cyanobacteria of the potentially toxic genus *Microcystis* was related the highest water temperature, higher concentrations of Na⁺ and an undisturbed epilimnion. The appearance of the green desmid alga *Staurastrum planctonicum* and several species of the cyanobacterial genera *Aphanizomenon* and *Anabaena* were connected with lower summer temperature and an undisturbed epilimnion but higher water level. The third type of summer dominance, *Fragilaria* and/or dinoflagellates was typical for years with summer disturbances (high discharge from the epilimnion) irrespective of the temperature.

Krell, R. K., L. P. Pedigo, J. H. Hill and M. E. Rice (2003). "Potential primary inoculum sources of Bean pod mottle virus in Iowa." *Plant Disease* **87**(12): 1416-1422.<Go to ISI>://000186712600003

A survey of Bean pod mottle virus (BPMV) in Iowa counties was conducted and the virus was found throughout the state. A long-term monitoring study (1989 to 2002) of the main BPMV vector, the bean leaf beetle, *Cerotoma trifurcata*, indicated that, in 2002, populations reached the highest abundance recorded in 14 years. Three potential sources for an early season primary inoculum source were found: (i) soybean (*Glycine max*) seed, (ii) overwintered bean leaf beetles, and (iii) alternate BPMV host plants. Examination of 5,804 and 8,064 soybean seedlings of two cultivars yielded 0 and 3 seedlings, respectively, infected with BPMV. In a separate test, BPMV was detected in mottled and nonmottled soybean seed. Some mottled seed did not contain BPMV, indicating that soybean seed coat mottling is an unreliable indicator for presence of the virus in seed. Of 194 naturally overwintered bean leaf beetles, only 1 transmitted BPMV to soybean. BPMV was detected serologically only in 1 alternate host, *Desmodium canadense*, out of 23 naturally occurring plant species collected from the field. The three inoculum sources discovered in Iowa in this study could be important primary sources when vector populations are high and indicate starting points for future epidemiological investigations.

Kwarteng, A. Y. and A. Al-Enezi (2004). "Assessment of Kuwait's Al-Qurain landfill using remotely sensed data." *Journal of Environmental Science and Health Part a- Toxic/Hazardous Substances & Environmental Engineering* **39**(2): 351-364.<Go to ISI>://000189352000005

Kuwait's Al-Qurain landfill problem resulted from indiscriminate dumping of domestic and industrial waste in an abandoned quarry in the late 1970s and early 1980s. The landfill and surrounding areas were set aside for a government housing project without an environmental assessment of the impact of the landfill on the project. Inhabitants of the newly constructed housing area experienced persistent foul odor emanating from the landfill site. Since then, the issue has generated a lot of public interests, and several remediation measures have been adopted. In this preliminary study, several remotely sensed data consisting of Landsat Multispectral Scanner (MSS), Landsat Thematic Mapper (TM), IKONOS, and synthetic aperture radar (SAR) acquired between 1972 and 2000 were processed and assessed for their usefulness to study and monitor the landfill site. The imagery provided a historical perspective of how the areas had changed over the last 30 years. Other useful information of the landfill obtained from the satellite imagery included the spatial extent, spectral reflectance, surface temperature, and Surface roughness. The landfill site showed higher surface temperatures compared to the immediate surrounding areas—a process that could accelerate the biodegradation and the release of landfill gases. Such dataset could be incorporated into a GIS for the long-term monitoring of the site.

LaBrecque, J. J. and P. R. Cordoves (2004). "Short- and long-term monitoring of radon, thoron and carbon dioxide in soil-gas at Altos de pipe, Venezuela." *Journal of Radioanalytical and Nuclear Chemistry* **260**(2): 255-264.<Go to ISI>://000221331000003

We have measured radon and thoron activities in soil-gases since July 9, 1997 Cariaco earthquake (Mw=6.9) until the end of 2000. Carbon dioxide concentrations were also monitored between 1998-2000. The soil-gas was collected between 50-55 cm depths at two sampling points at Altos de pipe (Instituto Venezolano de Investigaciones Cientificas-IVIC) near Caracas, Venezuela. The radon and thoron measurements were performed daily employing radiation monitors with scintillation cells and the carbon dioxide was monitored with portable gas analyzers. Average weekly and monthly values were calculated and plotted for this three-four year period. In general, both the radon and carbon dioxide values showed sinusoidal trends due to seasonal changes. During the dry season the radon and carbon dioxide values decreased, while the radon activity was relative constant (flat) during the rainy season at one of the sampling points. Only two monthly radon values were seen to be anomalous in the graphs in respect to seven anomalous periods for the average weekly values. No

anomalous periods were clearly seen for carbon dioxide. Finally, it was difficult to try to relate these radon anomalous periods with specific earthquakes due to the large number of minor earthquakes during these years, but it seems that the minor earthquake ($M_b=5.9$) of October 4, 2000 could be associated with the radon anomalous period in September, when there were no other minor earthquakes (M_b greater than or equal to 4.0).

Lamberti, F., J. M. Waller and N. A. Van der Graaff (1983). Durable Resistance in Crops. Proceedings of a NATO Advanced Study Institute held September 30 October 1981. Martina Franca, Italy: pp 454

Latka, M., Z. Was, A. Kozik and B. J. West (2003). "Wavelet analysis of epileptic spikes." Physical Review E **67**(5): art. no.-052902. <Go to ISI>://000183482200088

Interictal spikes and sharp waves in human EEG are characteristic signatures of epilepsy. These potentials originate as a result of synchronous pathological discharge of many neurons. The reliable detection of such potentials has been the long standing problem in EEG analysis, especially after long-term monitoring became common in investigation of epileptic patients. The traditional definition of a spike is based on its amplitude, duration, sharpness, and emergence from its background. However, spike detection systems built solely around this definition are not reliable due to the presence of numerous transients and artifacts. We use wavelet transform to analyze the properties of EEG manifestations of epilepsy. We demonstrate that the behavior of wavelet transform of epileptic spikes across scales can constitute the foundation of a relatively simple yet effective detection algorithm.

Lawson, H. M. (1994). "Changes in Pesticide Usage in the United-Kingdom - Policies, Results, and Long-Term Implications." Weed Technology **8**(2): 360-365. <Go to ISI>://A1994NV58100031

Current United Kingdom (UK) government policy on pesticides is aimed at minimizing rather than arbitrarily reducing usage. It is to be achieved through a rigorous Approvals process, the setting of statutory maximum residue limits, regular monitoring, legislation on the safe use of pesticides on farms, and a core-funded research program on topics such as improved forecasting of pest infestations, more effective application techniques, alternative control strategies, integrated pest management and sustainable farming systems. Over the longer term these measures are expected to bring about substantial real decreases in pesticide usage, without the need to impose arbitrary reduction targets, such as have been implemented by several other European countries. Reductions in the usage of particular chemicals will also occur as a result of the implementation of European Community (EC) environmental legislation on pesticide levels in ground and drinking water and pesticide discharges into the North Sea. With herbicides, the tonnage of active ingredient applied in the UK declined substantially during the 1980s, due mainly to the increased use of products which were more biologically active at lower dosage rates than those they replaced. The actual percentage of crops sprayed remained at 95 to 100. Further reductions are likely in the 1990s, enhanced by factors such as dose-cutting by farmers in response to economic rather than environmental pressures and an increase in set-aside. Weed scientists are currently studying the long-term effects on weed population dynamics of reduced herbicide inputs in cereals, set-aside management, and more environmentally friendly, lower input rotations, as part of a wider program of research designed to provide government with scientifically based information upon which to decide future policies.

Leigh, R. A. and A. E. Johnston (1994). Long Term Experiments in Agricultural and Ecological Sciences. Conference to celebrate the 150th Anniversary of Rothamstead Experimental Station, Rothamstead, 14-17 July 1993, CAB International. pp 428

Lekht, E. E., V. A. Munitsyn and A. M. Tolmachev (2003). "Long-term monitoring of the water-vapor maser in NGC 7538: 1981-1992." Astronomy Reports **47**(10): 838-847. <Go to ISI>://000186130000006

We report the results of monitoring the H₂O maser in NGC 7538, which is associated with a star-forming region. The observations were carried out on the 22-meter telescope of the Pushchino Radio Astronomy Observatory. Two intervals of long-term variability of the integrated flux that reflect the cyclic activity of the maser have been distinguished (1981-1992 and 1993-2003); the data for the earlier activity cycle, 1981-1992, have been analyzed. The period of the long-time-scale variations is about 1314 years. Flares of individual spectral features and of two groups of features with mean radial velocities of -60 and -46.6 km/s have been observed. The flares lasted from 0.3 to 1 year. The emission features observed during the 1984-1985 flare at radial velocities between -62 and -58 km/s probably form a spatially compact group of Spots (< 10(15) cm) in NGC 7538 IRS1. The triplet structure of the spectra can be traced. The observed anticorrelations and correlations of the fluxes of the triplet components suggest that the maser spots may be located either in a protoplanetary disk or in a high-velocity gaseous outflow. (C) 2003 MAIK "Nauka/Interperiodica".

Lekht, E. E., V. A. Munitsyn and A. M. Tolmachev (2004). "Long-term monitoring of the water-vapor maser in NGC 7538: 1993-2003." Astronomy Reports **48**(3): 200-209. <Go to ISI>://000220707700003

The paper presents the results of monitoring the H₂O maser in NGC 7538, which is associated with a star-formation region, in 1993-2003. The observations were carried out on the 22-m radio telescope of the Pushchino Radio Astronomy Observatory (Russia). The variability of the maser emission displays a cyclic character. Two cycles of the long-term variability of the total flux were detected over the entire monitoring period (1981-2003): 1981-1993 and 1994-2003. The period of the variability is about 13 years. An anticorrelation of the emission in lateral sections of the spectra is observed, as is characteristic of protoplanetary disks. A drift in the radial velocity of the central component is observed (V -LSR = -60 km/s) with a drift rate of about 0.09 km/s per year. The water-vapor maser is most likely associated with a protoplanetary disk. (C) 2004 MAIK "Nauka/Interperiodica".

Lekht, E. E., N. A. Silant'ev, J. E. Mendoza-Torres, M. I. Pashchenko and V. V. Krasnov (2001). "A study of the kinematics of the H₂O maser sources S269 and W75S from long-term monitoring." Astronomy & Astrophysics **377**(3): 999-1006. <Go to ISI>://000171457900024

It is shown that basic characteristics of turbulence can be derived from temporal behaviour, shape and radial-velocity drift of a spectral line. To perform this analysis, a 20-year monitoring of the H₂O maser emission sources S269 and W75S was used. It is shown that the observed sinusoidal variation of the radial velocity of the main emission feature in S269 with a period of 26 years is not caused by Keplerian motion. Most likely, it results from rotation of a non-uniform turbulent vortex

with a diameter of about 1 AU. Within the framework of this model, asymmetry of the emission feature at 20.1 km s⁻¹ and a jump of the linewidth, which took place after a strong arc in 1991, are explained. In W75S anticorrelation between fluxes of several emission features with close radial velocities is found. This anticorrelation is explained by competition of spatial modes of the emission for pumping in a partially saturated maser. It is shown that in the model of a maser in an expanding envelope (which is, most likely, the case in W75S) the emission features with anticorrelated fluxes form a spatially compact group.

Levy, M. L., M. Wang, H. E. Aryan, K. Yoo and H. Meltzer (2003). "Microsurgical keyhole approach for middle fossa arachnoid cyst fenestration." *Neurosurgery* **53**(5): 1138-1144. <Go to ISI>://000186524600027

OBJECTIVE: The optimal surgical treatment for symptomatic temporal arachnoid cysts is controversial. Therapeutic options include cyst shunting, endoscopic fenestration, and craniotomy for fenestration. We reviewed the results for patients who were treated primarily with craniotomy and fenestration at our institution, to provide a baseline for comparisons of the efficacies of other treatment modalities. **METHODS:** A retrospective review of data for 50 children who underwent keyhole craniotomy for fenestration of temporal arachnoid cysts between 1994 and 2001 was performed after institutional review board approval. During that period, the first-line treatment for all symptomatic middle fossa arachnoid cysts was, microcraniotomy for fenestration. Microsurgical dissection to create communications between the cyst cavity and basal cisterns was the goal. All patient records were reviewed and numerous variables related to presentation, cyst size, and classification, treatment, cyst resolution, symptom resolution, follow-up periods, and cyst outcomes, were recorded. **RESULTS:** Fifty temporal arachnoid cysts in 50 treated patients were identified. The average-age at the time of surgery was 68 +/- 57.2 months. The follow-up periods averaged 36 months. There were 34 male and 16 female patients in the series. Twenty-six, cysts were on the left side. Indications for surgery included intractable headaches (45%), increasing cyst size (21%), seizures (5%), and hemiparesis (8%). The symptoms most likely to improve, were hemiparesis (100%) and abducens nerve palsies. Headaches (67%) and seizure disorders (50%) were less likely to improve. Nine patients exhibited progressive increases in cyst size in serial imaging studies mean of 40 +/- 21 months before intervention. In Those patients were monitored for a the entire series, 82% of patients demonstrated decreases in cyst size in serial imaging studies. Of those patients, 18% demonstrated complete cyst effacement. Overall, 83% of patients with Grade II cysts and 75% of patients with Grade III cysts exhibited evidence of decreases in cyst size in long-term monitoring. Two patients required shunting after craniotomy (4%). Hospital stays averaged 3.4 days. Total surgical times averaged 115 minutes. No significant blood loss occurred (5-50 ml). Complications included spontaneously resolving pseudomeningocele (10%), transient Cranial Nerve III palsy (6%), cerebrospinal fluid leak (6%), subdural hematoma (4%), and wound infection (2%). **CONCLUSION:** A microsurgical keyhole approach to arachnoid cyst fenestration is a safe effective method for treating middle fossa cysts. This procedure can be performed with minimal morbidity via a minicraniotomy. Compared with an endoscopic approach, better control of hemostasis can be obtained, because of the ability to use bipolar forceps and other standard instruments. The operative time and length of hospital stay were not excessively increased.

Lim, D. S. S. and M. S. V. Douglas (2003). "Limnological characteristics of 22 lakes and ponds in the Haughton Crater region of Devon Island, Nunavut, Canadian High Arctic." *Arctic Antarctic and Alpine Research* **35**(4): 509-519. <Go to ISI>://000189380400014

The physical and chemical limnological characteristics of 22 lakes and ponds in the remote region of Haughton Impact Crater, Devon Island, Nunavut, Canada, were explored. Our overall goals were to gather baseline information for use in climate and environmental change monitoring programs in the High Arctic as well as to compare these observations to other limnological surveys conducted in high-latitude regions. Study sites were alkaline (pH(mean) = 8.3), ultraoligotrophic (TPUmean = 3.7 µg L⁻¹), and phosphorus limited. Major and minor ionic concentrations of most sites are comparable to other previously surveyed high arctic sites. Lakes and ponds in close contact with the impact-generated carbonate melt rocks associated with Haughton Crater were distinguished from the larger data set due to their elevated Mg²⁺, SO₄²⁻, Ba²⁺, Sr²⁺, and SiO₂ concentrations. Selenite (CaSO₄·2H₂O) formations commonly associated with the lower levels of the carbonate melt sheets were identified as a likely source for the elevated SO₄²⁻ concentrations in these sites. Principal Components Analysis separated sites along a conductivity and nutrient gradient on the primary and secondary axes, respectively. This study serves as a baseline for a long-term monitoring program in the Haughton Crater region.

Liston, A., B. L. Wilson, W. A. Robinson, P. S. Doescher, N. R. Harris and T. Svejcar (2003). "The relative importance of sexual reproduction versus clonal spread in an aridland bunchgrass." *Oecologia* **137**(2): 216-225. <Go to ISI>://000185602300008

Festuca idahoensis (Idaho fescue) is a perennial caespitose grass, common in semi-arid rangelands of the Intermountain West. To determine how individuals are recruited into a population, we studied two long-term monitoring plots that were established in 1937 at the Northern Great Basin Experimental Range in southeastern Oregon. The plots measured 3.05x3.05 m, and were located approximately 30 m apart. One plot was ungrazed, the other was subject to moderate levels of cattle grazing. The number of *F. idahoensis* plants in both plots increased ten-fold between 1937 and 1996, but whether this was due primarily to reproduction by seed or clonal fragmentation was unknown. In 1996, we mapped and sampled 160 plants of *F. idahoensis*. We used dominant inter-simple sequence repeat (ISSR) markers and codominant allozyme markers in order to identify genetic individuals and measure genetic diversity. Both plots were characterized by high levels of genetic and clonal diversity. When information from ISSRs, allozymes and sample location were combined, 126 genets were recognized, each consisting of one to four samples (ramets). By measuring the diameter of clones surrounding plants that were present in 1937, we estimated that clonal spread occurred at a rate of approximately 3.7 cm per decade, and thus was of secondary importance in the maintenance and increase of *F. idahoensis* stands. Sexual reproduction, rather than clonal fragmentation, accounted for most of the recruitment of new plants into these plots. The grazed plot had fewer ramets, genotypes, and clones than the ungrazed plot, but the ramets were significantly larger. Levels of genetic diversity did not differ in the grazed and ungrazed plots, but there was some evidence for a small, but significant level of genetic differentiation between the two. The results also indicate that *F. idahoensis* has the potential to be a long-lived species with some individuals persisting in excess of 60 years. This study demonstrates how long-term monitoring can be supplemented by genetic analysis to obtain detailed information on the population dynamics of plants. In the case of this community dominant species, this provides essential information for understanding succession and developing management and restoration strategies.

Lobel, A., A. K. Dupree, R. P. Stefanik, G. Torres, G. Israelian, N. Morrison, C. de Jager, H. Nieuwenhuijzen, I. Ilyin and F. MUSAEV (2003). "High-resolution spectroscopy of the yellow hypergiant rho Cassiopeiae from 1993 through the outburst of 2000-2001." *Astrophysical Journal* **583**(2): 923-954.<Go to ISI>://000180636300039

We present an overview of the spectral variability of the peculiar F-type hypergiant rho Cas, obtained from our long-term monitoring campaigns over the past 8.5 yr with four spectrographs in the northern hemisphere. Between 2000 June and September an exceptional variability phase occurred when the V brightness dimmed by about a full magnitude. The star recovered from this deep minimum by 2001 April. It is the third outburst of rho Cas on record in the last century. We observe TiO absorption bands in high-resolution near-IR spectra obtained with the Utrecht Echelle Spectrograph during the summer of 2000. TiO formation in the outer atmosphere occurred before the deep brightness minimum. Atmospheric models reveal that the effective temperature decreases by at least 3000 K, and the TiO shell is driven supersonically with (M) over dot similar or equal to $5.4 \times 10^{-2} M_{\odot} \text{ yr}^{-1}$. Strong episodic mass loss and TiO have also been observed during the outbursts of 1945-1947 and 1985-1986. A detailed analysis of the exceptional outburst spectra is provided, by comparing with high-resolution optical spectra of the early M-type supergiants mu Cep (Ia) and Betelgeuse (Iab). During the outburst, central emission appears above the local continuum level in the split Na D lines. A prominent optical emission line spectrum appears in variability phases of fast wind expansion. The radial velocity curves of Halpha and of photospheric metal absorption lines signal a very extended and velocity-stratified dynamic atmosphere. The outburst spectra indicate the formation of a low-temperature, optically thick circumstellar gas shell of $3 \times 10^2 M_{\odot}$ during 200 days, caused by dynamic instability of the upper atmosphere of this pulsating massive supergiant near the Eddington luminosity limit. We observe that the mass-loss rate during the outburst is of the same order of magnitude as has been proposed for the outbursts of eta Carinae. We present calculations that correctly predict the outburst timescale, whereby the shell ejection is driven by the release of hydrogen ionization recombination energy.

London, L. (1998). "Use of a crop and job specific exposure matrix for retrospective assessment of long term exposure in studies of chronic neurotoxic effects of agrichemicals." *Occupational and Environmental Medicine* **55**(3): 194-201.<Go to ISI>://000072107700008

Rationale-Job exposure matrices (JEMs) are widely used in occupational epidemiology, particularly when biological or environmental monitoring data are scanty. However, as with most exposure estimates, JEMs may be vulnerable to misclassification. Objectives-To estimate the long term exposure of farm workers based on a JEM developed for use in a study of the neurotoxic effects of organophosphates and to evaluate the repeatability and validity of the JEM. Methods-A JEM was constructed with secondary data from industry and expert opinion of the estimate of agrichemical exposure within every possible job activity in the JEM to weight job days for exposure to organophosphates. Cumulative lifetime and average intensity exposure of organophosphate exposure were calculated for 163 pesticide applicators and 84 controls. Repeat questionnaires were given to 29 participants three months later to test repeatability of measurements. The ability of JEM based exposure to predict a known marker of organophosphate exposure was used to validate the JEM. Results-Cumulative lifetime exposure as measured in kg organophosphate exposure, was significantly associated with erythrocyte cholinesterase concentrations (partial $r^2=5\%$; $p < 0.01$), controlled for a range of confounders. Repeatability in a subsample of 29 workers of the estimates of cumulative (Pearson's $r=0.67$; 95% confidence interval (95% CI) 0.41 to 0.83), and average lifetime intensity of exposure (Pearson's $r=0.60$ 95% CI 0.31 to 0.79) was adequate. Conclusion-The JEM seems promising for farming settings, particularly in developing countries where data on chemical application and biological monitoring are unavailable.

Lu, Y. X., H. Dang, B. Middleton, Z. Zhang, L. Washburn, M. Campbell-Thompson, M. A. Atkinson, S. S. Gambhir, J. Tian and D. L. Kaufman (2004). "Bioluminescent monitoring of islet graft survival after transplantation." *Molecular Therapy* **9**(3): 428-435.<Go to ISI>://000220170100019

Islet transplantation offers a potential therapy to restore glucose homeostasis in type 1 diabetes patients. A method to image transplanted islets noninvasively and repeatedly would greatly assist studies of islet transplantation. Using recombinant adenovirus, we show that isolated rodent and human islets can be genetically engineered to express luciferase and then imaged after implantation into NOD-scid mice using a cooled charge-coupled device. The magnitude of the signal was dependent on the islet dose. Adenovirus-directed luciferase expression, however, rapidly attenuated. We next tested lentivirus vectors that should direct the long-term expression of reporter genes in transduced islets. Transplanted lentivirus-transduced islets restored euglycemia long term in streptozotocin-treated NOD-scid mice. The signal from implanted lentivirus-transduced islets was related directly to the implanted islet mass, and the signal did not attenuate over the observation period. Viral transduction, luciferase expression, and repeated imaging had no apparent long-term deleterious effects on islet function after implantation. These data demonstrate that the introduction of reporter genes into an isolated tissue allows the long-term monitoring of its survival following implantation. Such imaging technologies may allow earlier detection of graft rejection and the adjustment of therapies to prolong graft survival posttransplantation.

Luciani, N., G. Nasso, M. Gaudino, A. Abbate, F. Glieca, F. Alessandrini, F. Girola, F. Santarelli and G. Possati (2003). "Coronary artery bypass grafting in type II diabetic patients: A comparison between insulin-dependent and non-insulin-dependent patients at short- and mid-term follow-up." *Annals of Thoracic Surgery* **76**(4): 1149-1154.<Go to ISI>://000185717900042

Background. Diabetes is a well-established risk factor for coronary artery disease, and it is associated with an increased rate of early and late adverse events after myocardial revascularization by coronary artery bypass grafting. Methods. A prospective follow-up study was done to evaluate the short- term and mid-term outcomes of type II diabetic patients who had coronary artery bypass grafting at our institution between 1996 and May 1999. A total of 200 patients, 100 insulin-dependent diabetic patients (group I) and 100 non-insulin-dependent diabetic patients (group II), met the inclusion criteria of the study and were included in the clinical follow-up study. Results. The characteristics of the patients of the two groups were similar for baseline clinical angiographic and operative characteristics. In particular, no significant differences in cardiopulmonary bypass and aortic cross-clamping times were noted between the two groups. The number grafts per patient was similar between the two groups. There were no in-hospital deaths, but postoperative complications were different among the two series. In fact, 33% of patients in group I had at least one major complication compared with 20%

in group II ($p = 0.037$). The cumulative number of complications was 148 in group I and 69 in group II, and the mean number of complications per patient was 4.5 and 3.5 in groups I and II, respectively. The major differences in perioperative complication rates were found in the need for prolonged (> 24 hours) ventilation, occurrence of respiratory or renal insufficiency, and mediastinitis. The mean length of stay in the intensive care unit and for total hospitalization were longer in group I than group II (4.3 +/- 2.8 days versus 2.8 +/- 2.7 days [$p = 0.010$] and 11.1 +/- 2.2 days versus 7.2 +/- 2.4 group II [$p < 0.05$], respectively). At long-term follow-up, group I patients had a significantly higher mortality rate (29% versus 10%, $p < 0.001$). Moreover, overall late cardiac and noncardiac complication rates were significantly higher in group I than II (37% versus 22%, $p = 0.02$). In the multivariate analysis including several preoperative and operative variables, treatment by insulin, advanced age (> 75 years), left ventricular dysfunction (left ventricular ejection fraction < 35%), and complex lesions at coronary angiography (American Heart Association lesion classification type C lesion) were found as independent predictors of increased mortality. Conclusions. Our data show that patients with insulin-dependent type II diabetes who had coronary artery bypass grafting have a significantly higher rate of major postoperative complications with an extremely unfavorable short- and long-term prognosis. Diabetic patients on insulin treatment should be considered high-risk candidates for coronary artery bypass grafting and require intense perioperative and long-term monitoring. Further studies will be necessary to investigate whether such conclusions may be appropriate for newer surgical strategies such as off-pump operation. (C) 2003 by The Society of Thoracic Surgeons.

Lunderstadt, J. (2002). "Long term research on the infestation dynamics of beech scale (*Cryptococcus fagisuga* LIND.) and on the formation of necroses in a mixed stand of beech and valuable broad leaved trees." Allgemeine Forst Und Jagdzeitung **173**(11-12): 193-200. <Go to ISI>://000180012200001

In the Lower Saxonian billy region, Forest office Kattenbuhl, Forest district Brackenberg, the development of 55 to 73 year old beech trees after a mass propagation of beech scale (*Cryptococcus fagisuga*) in 1982/83 was followed for 15 years. In neighbouring mixed stands of beech and valuable broad leaved species from natural regeneration experimental twin plots ($r = 15$ m), each in valley-, side slope-, and plateau position were subjected to thinning of varied intensity at different time intervals. Irrespective of the treatment, scale infestation decreased from 1983 to 2001 on all plots. The relative share of infested trees as an average of the years 1985, 1988 and 1996 came to 15-20 % (fig 3). It remained similar in the individual classes of the 6 experimental plots with quantitative differences in the intensity of the attack by the scale (fig. 3). After 18 years the attack of the scale was stronger on the thinned plots, the necrosis caused by the scale remained similar in all cases (fig. 5). Maximum necrosis occurred on the thinned side slope plot within the class of dominated trees, on the corresponding unthinned one within the class of dominating trees (fig. 4). The necroses caused by an unidentified pathogen, probably *Nectria ditissima*, was observed only on all unthinned plots, it decreased from valley to plateau (fig. 5). Regular thinning measures are most important in the control of infestations. The time and intensity of the procedure are strongly influenced by the water regime of the stands. Up to 5 years after a mass propagation of the scale a higher proportion of final crop trees changing their social position should be preserved. As well the monitoring and control of xylophagous insects should be intensified within this time span.

Luyssaert, S., J. Mertens and H. Raitio (2003). "Support, shape and number of replicate samples for tree foliage analysis." Journal of Environmental Monitoring **5**(3): 500-504. <Go to ISI>://000183091600023

Many fundamental features of a sampling program are determined by the heterogeneity of the object under study and the settings for the error (α), the power (β), the effect size (ES), the number of replicate samples, and sample support, which is a feature that is often overlooked. The number of replicates, α , β , ES, and sample support are interconnected. The effect of the sample support and its shape on the required number of replicate samples was investigated by means of a resampling method. The method was applied to a simulated distribution of Cd in the crown of a *Salix fragilis* L. tree. Increasing the dimensions of the sample support results in a decrease in the variance of the element concentration under study. Analysis of the variance is often the foundation of statistical tests, therefore, valid statistical testing requires the use of a fixed sample support during the experiment. This requirement might be difficult to meet in time-series analyses and long-term monitoring programs. Sample supports have their largest dimension in the direction with the largest heterogeneity, i.e. the direction representing the crown height, and this will give more accurate results than supports with other shapes. Taking the relationships between the sample support and the variance of the element concentrations in tree crowns into account provides guidelines for sampling efficiency in terms of precision and costs. In terms of time, the optimal support to test whether the average Cd concentration of the crown exceeds a threshold value is 0.405 m(3) ($\alpha = 0.05$, $\beta = 0.20$, ES = 1.0 mg kg⁻¹ dry mass). The average weight of this support is 23 g dry mass, and 11 replicate samples need to be taken. It should be noted that in this case the optimal support applies to Cd under conditions similar to those of the simulation, but not necessarily all the examinations for this tree species, element, and hypothesis test.

Luyssaert, S., H. Raitio, P. Vervaeke, J. Mertens and N. Lust (2002). "Sampling procedure for the foliar analysis of deciduous trees." Journal of Environmental Monitoring **4**(6): 858-864. <Go to ISI>://000180404300006

Sampling can be the source of the greatest errors in the overall results of foliar analysis. This paper reviews the variability in heavy metal concentrations in tree crowns, which is a feature that should be known and understood when designing a suitable leaf sampling procedure. The leaf sampling procedures applied in 75 articles were examined. Most of the environmental studies used a closely related form of the UN/ECE-EC leaf sampling procedure, which was developed for the long-term monitoring of forest condition. Studies with objectives outside the UN/ECE-EC field of application should utilize a sampling procedure that is in accordance with the objectives of the study and based on the observed variation in pilot and similar studies. The inherent sources of heavy metal variability inside the stand, i.e. the crown class, stand management, site properties, crown dimensions, infections, seasons, etc. were discussed, but the underlying causes of this variability are rarely understood. The inherent variability in tree crowns is the reason for using leaf sampling as a tool in pollution studies. The objectives of a pollution study determine which sources of variability are utilized by the researcher.

MacDonald, G. B. and D. J. Thompson (2003). "Responses of planted conifers and natural hardwood regeneration to harvesting, scalping, and weeding on a boreal mixedwood site." Forest Ecology and Management **182**(1-3): 213-230. <Go to ISI>://000185054900015

Recent emphasis on ecosystem-based forest management has increased interest in promoting species mixtures to enhance stand-level diversity. However, there is little information on silvicultural approaches to regenerate mixtures of conifers and hardwoods in northern Ontario. This study tested fifth-year effects of harvest intensity (uncut, 50% partial cut with and without removal of residuals after 3 years, and clearcut), site preparation level (none and scalped), and chemical weeding frequency (none, single, and multiple) on survival and growth of planted white spruce (*Picea glauca* [Moench] Voss) and jack pine (*Pinus banksiana* Lamb.), height and density of hardwood regeneration, and cover of competing shrubs. The study is located in a hardwood-dominated mixedwood stand on a fertile, mesic, upland site in northeastern Ontario. Although throughfall precipitation, wind speed, and temperature were moderated by residual cover, only light level varied sufficiently among treatments to account for differences in regeneration success. Damage to regeneration by mammals, weather, or equipment was minor, but up to 17% of residual basal area was lost to windthrow in partial cuts. Scalping had no effect on the development of conifer seedlings, hardwood regeneration, or shrubs. Survival of conifer seedlings was enhanced by harvesting but not by weeding, and spruce survival exceeded pine survival at all harvest levels. Seedling height and diameter growth increased with harvest intensity and weeding frequency, and the beneficial effects of weeding increased with harvest intensity. Height and density of hardwood regeneration increased with harvest intensity and decreased with weeding frequency. Single weeding reduced but did not eliminate hardwoods. Harvesting slightly increased shrub cover and weeding sharply decreased it. Dense suckering of trembling aspen (*Populus tremuloides* Michx.) followed removal of residuals 3 years after the initial 50% partial cut. Thus, final removal cuts on mixedwood sites should be delayed until conifer seedlings are well established. Underplanting cannot be recommended for uncut mixedwood stands in Ontario because of unacceptably high seedling mortality. Compared to clearcutting, partial cutting without removal of residuals reduced fifth-year hardwood density on unweeded plots. However, hardwoods on that treatment overtopped spruce seedlings by 90 cm and pine seedlings by 64 cm. Partial cutting with reduced weeding produced acceptable stocking of conifer and hardwood regeneration, but did not promote seedling growth. Weeding was required to maintain spruce as a viable understory component, to ensure pine codominance with hardwoods, and to reduce shrub cover below 50%. Separating species into alternating patches or corridors may be more productive than promoting integrated mixtures, since it allows silvicultural treatments to be adapted to the needs of each species. Long-term monitoring of crop trees and associated vegetation following mixedwood management options on a range of boreal sites is required to advance the knowledge base and produce reliable operational guidelines. Crown Copyright (C) 2003 Published by Elsevier Science B.V. All rights reserved.

Macdonald, R. H., G. A. Lawrence and T. P. Murphy (2004). "Operation and evaluation of hypolimnetic withdrawal in a shallow eutrophic lake." *Lake and Reservoir Management* **20**(1): 39-53. <Go to ISI>://000220790600004

Chain Lake is a small (46 ha), shallow ($z(\text{mean}) = 6$ m, $z(\text{max}) = 9$ m) eutrophic lake in the interior of British Columbia, Canada. It suffers from severe blue-green algae blooms fed by internally loaded phosphorus. A hypolimnetic withdrawal system began operation in 1994, and is operated annually during the ice free period of the year. It is gravity driven (no mechanical pumps) and can operate at rates up to 80 L (.) s⁻¹. A monitoring program implemented as part of the withdrawal installation evaluated total phosphorus export, take water quality effects, and downstream environmental impacts. The withdrawal does not accelerate hydraulic flushing of the lake (residence time 0.5 - 3 years) but preferentially drains the water column below 5 m in every 100 days and drains the deepest region of the lake (6-9 m) approximately every two weeks. Total phosphorus export in the first year of operation was 30 kg, and optimization of the operation strategy should increase export to 60 kg per year, resulting in a net export of total phosphorus from the lake. Long term monitoring of water quality has been performed by resident volunteers for nine years (1994 - 2002) using Secchi measurements. Only a few data are available prior to the withdrawal operation. A non-parametric trend test found statistically significant increases of the monthly median Secchi depth for June ($p < 0.05$) and August ($p < 0.10$). Optimization of the withdrawal operation to maximize phosphorus export can be done by earlier start-up after ice off and increasing flow rates during the most anoxic periods. Downstream concerns with respect to the withdrawal operation include: dissolved oxygen depletion observed at the withdrawal site and up to 500 in downstream; nutrient enrichment with elevated concentrations of phosphorus observed in the withdrawn water; and elevated levels of ammonia, iron, and manganese observed in the withdrawn water in the first year of monitoring. The effects of anoxic water discharge were partially mitigated by a fountain aerator at the discharge point which increased the dissolved oxygen in the withdrawal stream by up to 2.0 mg (.) L⁻¹.

Machitani, Y., N. Kasai, Y. Fujinawa, H. Iitaka, N. Shirai, Y. Hatsukade, K. Nomura, K. Sugiura, A. Ishiyama and T. Nemoto (2003). "Vector HTS-SQUID system for ULF magnetic field monitoring." *IEEE Transactions on Applied Superconductivity* **13**(2): 763-766. <Go to ISI>://000184241700170

Anomalous magnetic field variations in the ultra low frequency (ULF) band were observed as precursory phenomena of earthquakes. We constructed a portable monitoring system by using HTS-SQUIDS for measuring the ULF environmental vector magnetic field. The operation of the system was verified at Mt. Bandai, an active volcano. The system safely worked over 100 hours on batteries. We have achieved long term monitoring with the system at the National Institute of Advanced Industrial Science and Technology (AIST) from February 7 to March 22 of 2002 using AC power. The measured magnetic field variations were compared with groundwater level, electric field and geo- electric pulse current variations measured at AIST in order to investigate the source of magnetic field radiation found during the long term monitoring.

MacKenzie, D. I., J. D. Nichols, J. E. Hines, M. G. Knutson and A. B. Franklin (2003). "Estimating site occupancy, colonization, and local extinction when a species is detected imperfectly." *Ecology* **84**(8): 2200-2207. <Go to ISI>://000185073100026

Few species are likely to be so evident that they will always be detected when present: Failing to allow for the possibility that a target species was present, but undetected at a site will lead to biased estimates of site occupancy, colonization, and local extinction probabilities. These population vital rates are often of interest in long-term monitoring programs and metapopulation studies. We present a model that enables direct estimation of these parameters when the probability of detecting the species is less than 1. The model does not require any assumptions of process stationarity, as do some previous methods, but does require detection/nondetection data to be collected in a manner similar to Pollock's robust design as used in mark-recapture studies. Via simulation, we show that the model provides good estimates of parameters for most scenarios considered. We illustrate the method with data from monitoring programs of Northern Spotted Owls (*Strix occidentalis caurina*) in northern California and tiger salamanders (*Ambystoma tigrinum*) in Minnesota, USA.

Makela-Kurtto, R. and J. Sippola (2002). "Monitoring of Finnish arable land: changes in soil quality between 1987 and 1998." Agricultural and Food Science in Finland **11**(4): 273-284.<Go to ISI>://000180234900003

This study is part of the long-term monitoring of Finnish arable land and it is based on soil analyses of 705 monitoring sites sampled in 1998. The same sites were sampled twice previously, in 1974 and 1987. We describe here the state of the Finnish cultivated soils in 1998 and changes in soil quality since 1987. The samples were analysed for organic C, volume weight, pH, P, K, Ca, S, Mg, Al, B, Cd, Co, Cr, Cu, Fe, Mn, Mo, Se and Zn. Macronutrients were extracted with 0.5 M ammonium acetate + 0.5 M acetic acid (pH 4.65) and most micronutrients, Al and heavy metals with the same solution + 0.02 M Na(2)EDTA. Hot water was used to extract B and Se. From 1987 to 1998, soil P, Ca, Mg, S, Cr, Cu, Zn, volume weight and electrical conductivity increased and soil K, B, pH and organic C decreased. There was no change in soil Al, Cd, Mn and Ni. Between 1987 and 1998, the use of P, K, B and Cu in mineral fertilisers declined whereas that of Ca in liming agents and Zn in mineral fertilisers increased. With the exception of P and Cu, these changes affected the concentrations, of easily soluble macro- and micronutrients in the soil accordingly. The slight decrease in soil pH might be due to the increase in the use of fertiliser N. The finding that soil Cd and Ni ceased to increase and that soil Cr increased only slightly was attributed to the dramatic reduction in. national emissions and bulk depositions of heavy metals.

Malmer, A. (2004). "Streamwater quality as affected by wild fires in natural and manmade vegetation in Malaysian Borneo." Hydrological Processes **18**(5): 853-864.<Go to ISI>://000220457200001

In 1998 a wild fire struck a paired catchment research area under long-term monitoring of hydrological and nutrient budgets. Streamwater quality as concentrations of dissolved and suspended particulate matter was monitored during 1.5-2.5 years after the fire in streams from seven different catchments. As the catchments, due to earlier experimental treatments, had different vegetations, varying effects related to different fire intensities were observed. The highest, mean stormflow, suspended sediment concentrations resulted from intensive fire in secondary vegetation that had experienced severe soil disturbance in previous treatments (crawler tractor timber extraction 10 years earlier). Stormflow concentrations were typically still about 400 mg l(-1) in 1999 (10-21 months after the fire), which was about the maximum recorded concentration in streams during initial soil disturbance in 1988. Forest fire in natural forest resulted in less than half as high stormflow concentrations. For dissolved elements in streamwater there was a positive relation between fuel load (and fire intensity) and concentration and longevity of effects. Stream baseflow dissolved nutrient concentrations were high in the months following the fire. Mean baseflow K concentrations were 8-15 mg l(-1) in streams draining catchments with intensive fire in secondary vegetation with large amounts of fuel. After controlled fire for forest plantation establishment in 1988 corresponding concentrations were 3-5 mg l(-1), and after forest fire in natural forest in this study about 2 mg l(-1). This study shows differences in response from controlled fire for land management, forest fire in natural forests and wild fires in manmade vegetations. These differences relate to resistance and resilience to fire for the involved ecosystems. There is reason to believe that wild fires and repeated wild fires during or after droughts, in successions caused by human influence, may lead to larger losses of ecosystem nutrient capital from sites compared with forest fires in natural forests. As fire in the humid tropics becomes more common, in an increasingly spatially fragmented landscape, it will be important to be aware of these differences. Copyright (C) 2004 John Wiley Sons, Ltd.

Marker, L. L., A. J. Dickman, M. G. L. Mills and D. W. Macdonald (2003). "Aspects of the management of cheetahs, *Acinonyx jubatus jubatus*, trapped on Namibian farmlands." Biological Conservation **114**(3): 401-412.<Go to ISI>://000185371200010

The Namibian cheetah population has recently undergone serious decline due to human-mediated removals, and investigating the rates and causes of such removals is an important aspect of the future management of cheetah populations outside protected areas. We examined cheetahs that were reported live-trapped or killed on Namibian farmlands between 1991 and 1999. A perceived threat to livestock or game led to the vast majority of live captures and to almost half of the cheetah deaths investigated. Despite this, livestock predation from cheetahs appeared to be minimal, and was usually perpetrated by cheetahs with injuries. Most of the cheetahs were trapped in groups, and cheetahs' relative sociality leads to the easy removal of entire social units. Long-term monitoring must include detailed consideration of these indiscriminate removals, as they involve many cheetahs, fluctuate between years, often go unreported, and are likely to have a serious impact on cheetah populations outside protected areas. (C) 2003 Elsevier Ltd. All rights reserved.

Marrs, R. H., J. D. P. Phillips, P. A. Todd, J. Ghorbani and M. G. Le Duc (2004). "Control of *Molinia caerulea* on upland moors." Journal of Applied Ecology **41**(2): 398-411.<Go to ISI>://000220587800018

1. *Molinia* encroachment has been viewed as a major threat to moorland conservation in the UK and elsewhere in Europe. In England and Wales agri-environment schemes are in place that aim to reduce *Molinia caerulea* and encourage the development of dwarf shrub vegetation. We tested a range of management treatments to achieve these objectives in two regions (the North Peaks and Yorkshire Dales) in England. 2. Within each region, the same experiment was carried out on two types of moorland vegetation, *Molinia*-dominated 'white' moorland and a mixture of *Molinia* and *Calluna vulgaris* 'grey' moorland. Burning, grazing and herbicide (glyphosate) treatments were applied in factorial combination at each of the four sites (two regions x two moor types). The responses of both vegetation and individual species were assessed. In addition, on the white moors two techniques for *Calluna* re-establishment were investigated, (i) removal of *Molinia* litter by raking and (ii) application of *Calluna* seed. 3. The data were analysed using a combination of univariate and multivariate analysis of variance to identify trends in this complex data set. 4. The only treatment that had consistent effects in the univariate analysis of variance was glyphosate application, which had similar effects on *Molinia* at all study sites. There was little difference between the use of low and high application rates (0.27 and 0.54 kg ai ha(-1)). There was little impact of herbicide use on other moorland species. Some species were affected on some sites in some years, but there were no consistent effects. Tentative identification of species that responded positively, negatively and erratically to glyphosate application was made. 5. Greater *Calluna* seedling densities were found in the plots where herbicide was applied, the *Molinia* litter was removed and seed was added. However, after initial colonization, there was a reduction in *Calluna* seedling densities as the *Molinia* recovered. This indicated that disturbance, seed addition and follow-up management are required for successful *Calluna* establishment. 6. There were significant differences in community response between both the regions and moorland types. The Dales had a relatively greater contribution of grassland species than the Peaks, where the grey site had a relatively greater dwarf shrub component. 7. Burning had little effect on community composition

but both grazing and herbicide application had important effects. Grazing of the grey sites, even at the very low levels used in this study, tended to push the communities towards bog-moorland vegetation, but little effect was found at the white sites. Glyphosate treatment tended to push communities towards acidic grassland at the Dales grey site but not at the Peaks. Successional change was also noted, with marked change between the third and fourth year and again between the fifth and sixth year. Grey sites showed the greatest temporal change. 8. Synthesis and applications. In terms of *Molinia* control and subsequent restoration of dwarf shrubs, there was marked variability of response between 'apparently similar' vegetation types in different regions. There were abrupt temporal changes taking place some years after treatment application and a significant length of time was required for change to be detected. Managers need to obtain a greater knowledge of initial floristic composition before starting the restoration process, be prepared to accept multiple outcomes of response (acid grassland vs. dwarf shrubs), be prepared for a long-term monitoring process and perhaps the inclusion of additional treatments for continued *Molinia* control (application of selective graminicides) and dwarf shrub restoration (disturbance and seed addition treatments).

Mason, C. F. and S. M. Macdonald (2004). "Growth in otter (*Lutra lutra*) populations in the UK as shown by long-term monitoring." *Ambio* **33**(3): 148-152. <Go to ISI>://000221132300006

European otters declined dramatically from the 1950s, disappearing from many rivers. We report here on long-term monitoring (from 1977) in 3 catchments in western Britain that were recolonized naturally and in 2 catchments in eastern England that were reinforced by captive-bred otters. A minimum of 16-years data was collected on each river until 2002. At a series of sites in each study river, the percentages which were positive for otters and the number of spraints per sprainting Site were recorded and combined to produce an annual index of population. One western river, naturally recolonized, showed rapid early population growth for 5 years, followed by slower growth, while growth was steadier in 2 catchments which already held some otters at the beginning of the study. Colonization on the eastern rivers was slower, with greater fluctuations over time. Annual population growth rates were estimated at 1-7%, higher in the earlier years. A strategy for annual monitoring of otters is recommended.

Mathie, M. J., A. C. F. Coster, N. H. Lovell, B. G. Celler, S. R. Lord and A. Tiedemann (2004). "A pilot study of long-term monitoring of human movements in the home using accelerometry." *Journal of Telemedicine and Telecare* **10**(3): 144-151. <Go to ISI>://000222027100005

We assessed the feasibility of using a waist-mounted, wireless triaxial accelerometer (TA) to monitor human movements in an unsupervised home setting to detect changes in functional status. A pilot study was carried out with six healthy subjects aged 80-86 years. The subjects wore a TA unit every day for two to three months. Each morning they carried out a short routine of directed movements that included standing, sitting, lying and walking. important movement variables were measured. During the rest of the day, subjects were monitored for falls, and variables such as metabolic energy expenditure were measured. All subjects remained healthy; there was no overall change in functional status and there were only slight fluctuations in health status. No longitudinal changes were detected in any of the variables measured during the directed routine. There was a moderate correlation between weekly self-reported health status and energy expenditure: subjects reported a lower health status for weeks in which they expended less energy. The TA system was found to be practical for long-term, unsupervised home monitoring. All subjects found the system simple to use and the TA unit unobtrusive and comfortable to wear. High compliance rates were achieved: the TA units were worn on 88% of the days in the study, for an average of 11.2 hours per day.

Matsuura, Y., M. Sanada, M. Takahashi, Y. Sakai and N. Tanaka (2001). "Long-term monitoring study on rain, throughfall, and stemflow chemistry in evergreen coniferous forests in Hokkaido, Northern Japan." *Water Air and Soil Pollution* **130**(1-4): 1661-1666. <Go to ISI>://000172012000125

Long-term study on acid precipitation monitoring at suburban forests in Sapporo city showed that bulk precipitation pH were below 4.8 in recent years. Throughfall and stemflow chemistry for two main coniferous species (*Abies sachalinensis* and *Picea jezoensis*) showed different regime for pH and element deposition. The mean annual pH values of throughfall and stemflow in *Picea* stand were 1.0 to 1.3 units higher than that of rain collected outside the forest. In contrast, mean annual pH of throughfall and stemflow in *Abies* stand were 0.3 to 0.5 units higher than that of rain. Mean annual inorganic nitrogen input via throughfall and stemflow were estimated 0.41 +/- 0.11 gN/m(2)/yr in *Abies* stand, 0.44 +/- 0.13 gN/m(2)/yr in *Picea* stand. Cation input via throughfall, especially for K, in *Picea* stand was 1.4 times as large as that in *Abies* stand. Mean annual input of S in both stands was the same level. The possible effects on surface soil properties and nutrient cycling in northern evergreen conifers was discussed.

Mattingly, G. E. G. and A. E. Johnston (1976). "Long-Term Rotation Experiments at Rothamsted and Saxmundham-Experimental-Stations - Effects of Treatments on Crop Yields and Soil Analyses and Recent Modifications in Purpose and Design." *Annales Agronomiques* **27**(5-6): 743-769. <Go to ISI>://A1976DN70300014

Mc Dougall, A. (2004). "Assessing the use of sectioned otoliths and other methods to determine the age of the centropomid fish, barramundi (*Lates calcarifer*) (Bloch), using known-age fish." *Fisheries Research* **67**(2): 129-141. <Go to ISI>://000220686600003

The use of stocked fish of a known age provide an opportunity to determine the practicality of use of otolith morphometrics and fish length to estimate the age of barramundi (*Lates calcarifer*) and determine accuracy of sectioned otolith age estimates. Otoliths were collected from 119 stocked barramundi and were compared against the known age of the fish (range: 0.75-8.64 years). The otoliths of barramundi appear to grow in three distinct phases when compared to the total length of the fish (TL), with a final change in otolith growth coinciding at the approximate size of sex change for this species (900 mm TL). Otolith growth is correlated linearly in all directions throughout to total growth of the otolith. Linear relationship of the sectioned otolith age estimates and known ages was highly significant ($r^2 = 0.89$), with nearly 88% of the fish assigned to the correct age class with an index of average percent error (IAPE) of 3.2%. The otolith weight-age relationship for the known-age fish described by the equation, $\text{age} = 17.43 (\text{otolith weight}) + 0.981$, accounted for more than 71% of the variability. The use of any of the three otolith dimensions (length, breadth, width), otolith weight or fish total length (TL) provided a similar population age structure to that of sectioned otoliths ages ($P > 0.05$). Because of significant time savings and costs associated with the techniques, use of otolith weight or even fish TL relationships with

fish age offer a real alternative to reading sectioned otoliths, as long as enough samples are used to account for any bias from sampling error. Use of otolith weight alone could reduce laboratory costs by 96% when compared to sectioned otoliths, and has real utility for use in long-term monitoring. (C) 2003 Elsevier B.V. All rights reserved.

McDonald, T. L. (2003). "Review of environmental monitoring methods: Survey designs." Environmental Monitoring and Assessment **85**(3): 277-292. <Go to ISI>://000183201400004

During the past decade and a half, environmental monitoring programs have increased in number and importance. Large scale environmental monitoring programs often present design difficulties because they tend to measure many (sometimes hundreds) of parameters through space and time. This paper reviewed and summarized one important component of environmental monitoring programs, the statistical survey design. Survey designs used for long-term monitoring programs lasting multiple (greater than or equal to 3) occasions were reviewed, paying special attention to those published after 1985. During this review, two key components of the overall survey design were identified. The first key component was the membership design. Groups of population units sampled the same occasion were called panels here, and the membership design specified which units were members of which panels. The second component was the revisit design that specified when panels were to be revisited. Membership designs varied, but some form of simple random or systematic design was popular. Among revisit designs, four basic patterns were found in the literature and their relative strengths and weaknesses were summarized. To efficiently discuss revisit designs, a new unified short-hand notation was proposed and adopted.

McEwen, J. and A. E. Johnston (1979). "Effects of Subsoiling and Deep Incorporation of P-Fertilizers and K-Fertilizers on the Yield and Nutrient-Uptake of Barley, Potatoes, Wheat and Sugar-Beet Grown in Rotation." Journal of Agricultural Science **92**(JUN): 695-702. <Go to ISI>://A1979GZ96400020

McWhorter, S., K. Powell and S. M. Serkiz (2002). "Development of a down-well TCE sensor for long-term monitoring applications." Abstracts of Papers of the American Chemical Society **223**: 061-ANYL. <Go to ISI>://000176296700320

Michel, J. (2004). "Regional management strategies for federal offshore borrow areas, US East and Gulf of Mexico coasts." Journal of Coastal Research **20**(1): 149-154. <Go to ISI>://000220549900012

With the increased demand for Federal sand and gravel resources on the outer continental shelf, the Minerals Management Service (MMS) is developing strategies for environmentally sound and fiscally responsible management of the resource. A process is needed for planning, decisionmaking, and coordination among stakeholders. Two workshops were conducted in Texas and New Jersey to solicit input from Federal, State, and local government representatives, university researchers, and private companies on key issues. Based on the results of the workshop, it was recommended that sand management task forces be established in each state, starting with those states that can provide a strong technical and administrative lead and have a high level of interest in accessing Federal borrow sites. Sand management task forces would be responsible for planning, coordinating, and facilitating the use of OCS sand for beach nourishment and coastal restoration projects. MMS's responsibilities include taking the lead in the design and funding of long-term monitoring studies of the impacts of dredging OCS sand, sponsoring workshops on technical and policy issues, and providing a clearinghouse for dissemination of studies and findings on actual environmental impacts, focusing on key issues such as cumulative impacts.

Mihaescu, M. and B. A. Malow (2003). "Sleep disorders: a sometimes forgotten cause of nonepileptic spells." Epilepsy & Behavior **4**(6): 784-787. <Go to ISI>://000187243300032

We present a patient with spells of loss of awareness in which the initial diagnostic consideration was partial epilepsy. The patient underwent video-EEG long-term monitoring which raised suspicion of nonepileptic events, but could not exclude simple partial seizures. A failed therapeutic trial with antiepileptic medication and adverse events prompted reevaluation of the case. Sleep studies, including polysomnography and multiple sleep latency testing (MSLT), confirmed a sleep disorder, i.e., narcolepsy, which responded to specific therapy with resolution of the spells. (C) 2003 Elsevier Inc. All rights reserved.

Mikati, M. A., Y. Comair, R. Ismail, R. Faour and A. C. Rahi (2004). "Effects of epilepsy surgery on quality of life: a controlled study in a Middle Eastern population." Epilepsy & Behavior **5**(1): 72-80. <Go to ISI>://000188814900012

The purpose of this study was to investigate which areas of quality of life (QOL) change after epilepsy surgery and generate QOL data specific to the Lebanese population. The QOL of 20 consecutive patients 1 year after surgery was compared (using the ESI-55 scale) with that of 20 matched patients who underwent the same presurgical evaluation, but no surgery. Overall QOL improved in both groups, but was greater in the surgery group (85% seizure free as compared to 0% in nonsurgery group). Significant differences were noted within the "well-being" domain including health perception (5/9 items), energy-fatigue (2/4), and emotional well-being (2/5). Differences were less common in the "functioning" domain including physical (1/10 items), social (1/2), and cognitive (0/5) functioning scales, and in the role limitation domain (1/17 items). Our patients experienced, 1 year after epilepsy surgery, improvements similar to those reported in Western populations after a similar period: they had marked improvements in overall QOL, health perception, well-being, and cognitive functioning areas. They had less remarkable improvements in social functioning and role limitation areas. (C) 2003 Elsevier Inc. All rights reserved.

Misra, A. K., H. Daniel, R. Till and G. J. Blair (1999). "Effect of long term crop rotations and rewetting of soil on stability." Soil Use and Management **15**(4): 254-255. <Go to ISI>://000085736900010

Soils, of clay texture, were taken from two crop rotations in a long term trial, (i) maize - spring oats maize, (ii) maize - spring oats - autumn oats - red clover, and from an adjacent uncropped fenceline. Wet sieving was preceded by wetting under vacuum, wetting under tension or by direct immersion. The undisturbed soil was the most stable; the inclusion of clover in the rotation improved aggregate stability. Direct immersion was most disruptive in disintegrating aggregates followed by vacuum and pre-wetting under tension.

Moehrl, M., B. Dennenmoser and C. Garbe (2003). "Continuous long-term monitoring of UV radiation in professional mountain guides reveals extremely high exposure." *International Journal of Cancer* **103**(6): 775-778. <Go to ISI>://000180639400011
 Ultraviolet radiation (UVR) is estimated to be one of the most important risk factors for non-melanoma and melanoma skin cancers. High occupational UV exposure is assumed to be associated with skin cancer. Mountain guides receive considerable UV doses due to altitude-related increase of UVR and reflection from snow- and ice-covered surfaces. The aim of our study was to assess the annual occupational UV exposure of mountain guides. Spore film test chambers containing spores of *Bacillus subtilis* (VioSpor) were used as UV dosimeters with a spectral sensitivity profile similar to erythema-weighted data calculated from spectro-radiometric measurements. Nine mountain guide instructors carried dosimeters on the sides of their heads on a total of 1,406 working days during one year (July 1999-June 2000). Dosimeters were changed monthly. Measurements of 92 months could be evaluated (4-12 months/mountain guide). The mean individual monthly UV exposure was 107 standard erythema doses (SED) (median 71 SED; range 10-505 SED). The mean annual cumulative UV exposure was 1,097 SED (median 1,273 SED; range 312-1,770 SED) per mountain guide. The mean UV dose per day (4-10 hr) was 6.6 SED (median 5.7 SED; range 0.6-24.2 SED). This is the second study of continuous annual UV dosimetry in a cohort of outdoor workers. Our study showed that it is not sufficient to interpolate annual UV exposure from a few days' measurements. Only long-term dosimetry can give reliable yearly information of UVR load. Median daily UV exposure exceeded limits for UV radiation (e.g., ACGIH effective dose 30 J/m²) per 8 hr period corresponding to 1.08 SED/day) 6-fold; maximal exposure exceeded these limits 23-fold. These extremely high exposure values are suggestive for an increased risk of skin cancer and thorough epidemiologic studies in the collectives of professional and recreational mountaineering are required. (C) 2002 Wiley-Liss, Inc.

Morel, T., S. V. Marchenko, A. K. Pati, K. Kuppaswamy, M. T. Carini, E. Wood and R. Zimmerman (2004). "Large-scale wind structures in OB supergiants: a search for rotationally modulated H alpha variability." *Monthly Notices of the Royal Astronomical Society* **351**(2): 552-568. <Go to ISI>://000221976900017

We present the results of a long-term monitoring campaign of the H α line in a sample of bright OB supergiants (O7.5-B9) which aims at detecting rotationally modulated changes potentially related to the existence of large-scale wind structures. A total of 22 objects were monitored during 36 nights spread over six months in 2001-2002. Coordinated broadband photometric observations were also obtained for some targets. Conspicuous evidence for variability in H α is found for the stars displaying a feature contaminated by wind emission. Most changes take place on a daily time-scale, although hourly variations are also occasionally detected. Convincing evidence for a cyclical pattern of variability in H α has been found in two stars: HD 14134 and HD 42087. Periodic signals are also detected in other stars, but independent confirmation is required. Rotational modulation is suggested from the similarity between the observed recurrence time-scales (in the range 13-25 d) and estimated periods of stellar rotation. We call attention to the atypical case of HD 14134, which exhibits a clear 12.8-d periodicity, both in the photometric and in the spectroscopic data sets. This places this object among a handful of early-type stars where one may observe a clear link between extended wind structures and photospheric disturbances. Further modelling may test the hypothesis that azimuthally-extended wind streams are responsible for the patterns of spectral variability in our target stars.

Morin, S., S. Henderson, J. A. Fabrick, Y. Carriere, T. J. Dennehy, J. K. Brown and B. E. Tabashnik (2004). "DNA-based detection of Bt resistance alleles in pink bollworm." *Insect Biochemistry and Molecular Biology* **34**(11): 1225-1233. <Go to ISI>://000225209200009

Evolution of resistance by pests is the main threat to long-term insect control by transgenic crops that produce *Bacillus thuringiensis* (Bt) toxins. We previously identified three mutant alleles (r1, r2, r3) of a cadherin gene in pink bollworm (*Pectinophora gossypiella*) linked with recessive resistance to Bt toxin Cry1Ac and survival on transgenic Bt cotton. Here we describe a polymerase chain reaction (PCR)-based method that detects the mutation in genomic DNA of each of the three resistant alleles. Using primers that distinguish between resistant and susceptible (s) alleles, this method enables identification of 10 genotypes (r1r1, r1r2, r1r3, r2r2, r2r3, r3r3, r1s, r2s, r3s, and ss) at the cadherin locus. For each of the three resistant alleles, the method detected the resistance allele in a single heterozygote (r1s, r2s, or r3s) pooled with DNA from the equivalent of 19 susceptible (ss) individuals. The results suggest that the DNA-based detection method described here could greatly increase the efficiency of monitoring for resistance to Cry1Ac compared to bioassays that detect rare individuals with homozygous resistance. (C) 2004 Elsevier Ltd. All rights reserved.

Morlese, J., I. A. Teo, J. W. Choi, B. Gazzard and S. Shaunak (2003). "Identification of two mutually exclusive groups after long-term monitoring of HIV DNA 2-LTR circle copy number in patients on HAART." *Aids* **17**(5): 679-683. <Go to ISI>://000182566700005

Background: Anti-retroviral drug therapy reduces but does not abolish HIV transmission and replication throughout the body. HIV DNA 2-long terminal repeat (2-LTR) circles have been shown in point-based studies to persist in some patients whose plasma HIV RNA was undetectable. However, the degree of fluctuation of circle copy number over time has not been determined. Methods: A reliable, reproducible and robust quantitative LightCycler (LC qPCR)-based assay for HIV DNA 2-LTR circles in peripheral blood mononuclear (PBMC) cells was established. A prospective, longitudinal study of these circles was undertaken in HIV-1-positive patients on anti-retroviral therapy whose plasma HIV RNA was undetectable at <50 copies/ml. Patients starting therapy for the first time were also monitored. Results: A cohort of 60 patients whose plasma HIV RNA was undetectable for 32 months were monitored for circles for 15 months. The circle copy number ranged from <10 to 620 copies/10⁶ PBMC cells. The circle-negative (<10 copies/1x10⁶ PBMC) cells group of 36 patients and the circle-positive (>10 copies/10⁶ PBMC cells) group of 24 patients were mutually exclusive (P<0.0001). The mean circle half-life in seven of the 10 patients starting anti-retroviral therapy for the first time was 5.7 days. Conclusion: The circle assay is useful for identifying those patients in whom transmission of infectious virus continues despite prolonged periods of time during which plasma HIV RNA is undetectable. New drug combinations and new therapeutic approaches should be aimed at those patients whose plasma HIV RNA is undetectable but who remain positive for 2-LTR circles. (C) 2003 Lippincott Williams & Wilkins.

Morrell, M. J. (2002). "Antiepileptic medications for the treatment of epilepsy." *Seminars in Neurology* **22**(3): 247-258. <Go to ISI>://000180122600004

Epilepsy, is one of the most common neurological conditions encountered worldwide. The development of newer antiepileptic drugs (AEDs) has expanded over recent years, and the use of such drugs for indications other than epilepsy has also broadened. These factors insure that the majority of health care providers will be using an increasing number of AEDs in the care of their patients. Contained herein is a review of the mechanism of action of AEDs, individual drugs and their potential drug interactions, and general principles to guide the clinician in selection, implementation, and long-term monitoring of AEDs.

Morris, J. W. F., N. C. Vasuki, J. A. Baker and C. H. Pendleton (2003). "Findings from long-term monitoring studies at MSW landfill facilities with leachate recirculation." *Waste Management* **23**(7): 653-666. <Go to ISI>://000185292500011

This paper presents findings from long-term monitoring studies performed at full-scale municipal solid waste landfill facilities with leachate recirculation. Data from two facilities at a landfill site in Delaware, USA were evaluated as part of this study: (1) Area A/B landfill cells; and (2) two test cells (one with leachate recirculation and one control cell). Data from Area A/B were compared with proposed waste stability criteria for leachate quality, landfill gas production, and landfill settlement. Data from the test cells were directly compared with each other. Overall, the trends at Area A/B pointed to the positive effects (i.e., more rapid waste degradation) that may be realized through increasing moisture availability in a landfill relative to the reported behavior of more traditionally operated (i.e., drier) landfills. Some significant behavioral differences between the two test cells were evident, including dissimilarities in total landfill gas production quantity and the extent of waste degradation observed in recovered time capsules. Differences in leachate quality were not as dramatic as anticipated, probably because the efficiency of the leachate recirculation system at distributing leachate throughout the waste body in the recirculation cell was low. (C) 2003 Elsevier Ltd. All rights reserved.

Motta, R. (2002). "Old-growth forests and silviculture in the Italian Alps: the case-study of the strict reserve of Paneveggio (TN)." *Plant Biosystems* **136**(2): 223-231. <Go to ISI>://000182500200011

All forests in the Italian Alps have been affected by humans in some way, either through direct periodic destruction of the forest or by more subtle forms of management and habitat manipulation. For this reason it is very difficult to find stands with "old-growth properties". However, in the last century there has been a noticeable reduction in many human activities in the mountains and, as a result, many forest stands have developed naturally over the past few decades, even if their composition and structure still reflect past human activity. This makes it particularly important to study the unmanaged parts of previously managed forests: the past history, present structures and long-term monitoring of these forest stands are fundamental steps for increasing our knowledge of the natural forest stand dynamics. Knowledge of this sort is an important reference tool for the present and future development of near-natural silviculture aimed at producing commodities as well as maintaining environmental values. In this paper, a case study in the forest of Paneveggio is presented. In this forest a strict forest reserve of about 100 ha was established, and a long-term forest dynamics study was set up in four 1-ha plots. The main results of the study of the stand histories of these plots are presented, and their current naturalness status is discussed.

Mulder, C., D. De Zwart, H. J. Van Wijnen, A. J. Schouten and A. M. Breure (2003). "Observational and simulated evidence of ecological shifts within the soil nematode community of agroecosystems under conventional and organic farming." *Functional Ecology* **17**(4): 516-525. <Go to ISI>://000184573900012

1. Soil sustainability implies a sufficient diversity and abundance of organisms to perform soil functions and to resist environmental stress. Previous studies have shown the importance of functional biodiversity for soil organisms. 2. Soil samples have been collected within the framework of a long-term monitoring programme in the Netherlands. Nematological and microbiological techniques were combined to facilitate a more comprehensive understanding of possible below-ground effects of land management. 3. A possible bias due to stochastic circumstances was investigated. The Mantel test showed that the diversity at species level is largely related to air temperature, but at genus level the effect of temperature disappears. No direct influence of rainfall on the soil biodiversity was found in our model. 4. To extrapolate our data to a national level, habitat-response relationships for soil organisms have been derived. Generalized linear models (GLMs) and Monte Carlo simulation allowed the estimation of the probability of occurrence at a given abundance for 95 nematode genera. 5. Our study describes the influence of abiotic conditions and land use intensity on the composition of nematode communities in grasslands on sand. The results obtained reveal a major influence of pH and livestock density on the diversity of the nematode community at both taxonomic levels as well as at different trophic levels (feeding habits). The presence and abundance of soil nematodes decrease with cattle pressure. 6. Functional diversity decreases with increasing management intensity. It is shown that the Shannon diversities of bacterial feeding nematodes and fungal feeding nematodes are strictly related to cattle pressure, whereas the bacterial biomass occurring under organic farming scores higher than in other farming systems.

Mustafic, P., M. Mrakovocic, M. Caleta, I. Radic, D. Zanella, Z. Mihaljevic and I. Ternjej (2003). "Loaches in a long term study of the Drava River in Croatia." *Folia Biologica-Krakow* **51**: 143-146. <Go to ISI>://000188922200024

The diversity, species composition and structure of the fish community were studied in the vicinity of three power plant reservoirs in the middle part of the Drava River in Croatia. Over a period of twenty years in a collection of 25,913 fishes, 56 different fish species belonging to 16 families were recorded. The family Cobitidae is represented by two species: *Cobitis elongatoides* and *Misgurnus fossilis*, while the family Balitoridae is represented by only one species, *Barbatula barbatula*. The presence of the Cobitidae family was recorded in eleven of seventeen investigated localities, while Balitoridae was found in six localities. In the studied fish community, the percentage of *C. elongatoides* is 1.41% of the total number of individuals, and *B. barbatula* is 1.02%. *M. fossilis* is a rare species (0.03 %). Both *C. elongatoides* and *B. barbatula* were not caught at the beginning of investigation. *C. elongatoides* and *R. barbatula* were first caught in 1985, while *M. fossilis* was first caught in 1996. The proportion of *C. elongatoides* in the entire community increased, while the proportion of *B. barbatula* decreased in later years.

Najafi, B., K. Aminian, A. Paraschiv-Ionescu, F. Loew, C. J. Bula and P. Robert (2003). "Ambulatory system for human motion analysis using a kinematic sensor: Monitoring of daily physical activity in the elderly." *IEEE Transactions on Biomedical Engineering* **50**(6): 711-723. <Go to ISI>://000183413100008

A new method of physical activity monitoring is presented, which is able to detect body postures (sitting, standing, and lying) and periods of walking in elderly persons using only one kinematic sensor attached to the chest. The wavelet transform, in conjunction with a simple kinematics model, was used to detect different postural transitions (PTs) and walking periods during daily physical activity. To evaluate the system, three studies were performed. The method was first tested on 11 community-dwelling elderly subjects in a gait laboratory where, an optical motion system (Vicon) was used as a reference system. In the second study, the system was tested for classifying PTs (i.e., lying-to-sitting, sitting-to-lying, and turning the body in bed) in 24 hospitalized elderly persons. Finally, in a third study monitoring was performed on nine elderly, persons for 45-60 min during their daily physical activity. Moreover, the possibility-to-perform long-term monitoring over 12 h has been shown. The first study revealed a close concordance between the ambulatory and reference systems. Overall, subjects performed 349 PTs during this study. Compared with the reference system, the ambulatory system had an overall sensitivity of 99% for detection of the different PTs. Sensitivities and specificities were 93% and 82% in sit-to-stand, and 82% and 94% in stand-to-sit, respectively. In both first and second studies, the ambulatory system also showed a very high accuracy (> 99%) in identifying the 62 transfers or rolling out of bed, As well as 144 different posture changes to the back, ventral, right and left sides. Relatively high sensitivity (> 90%) was obtained for the classification of usual physical activities in the third study in comparison with visual observation. Sensitivities and specificities were, respectively, 90.2% and 93.4% in sitting, 92.2% and 92.1% in "standing + walking," and, finally, 98.4% and 99.7% in lying. Overall detection errors (as percent of range) were 3.9% for "standing.+ walking," 4.1% for sitting, and 0.3% for lying. Finally, overall symmetric mean average errors were 12% for "standing + walking," 8.2% for sitting, and 1.3% for lying.

Nakahara, D., M. Nakamura, M. Iigo and H. Okamura (2003). "Bimodal circadian secretion of melatonin from the pineal gland in a living CBA mouse." Proceedings of the National Academy of Sciences of the United States of America **100**(16): 9584-9589.<Go to ISI>://000184620000086

Circadian melatonin secretion is the best-known output signal from the circadian pacemaker in the suprachiasmatic nucleus that indicates internal conditions of the body. We have established a system that enables long-term monitoring of melatonin secretion by implanting a transverse microdialysis probe in or near the pineal gland in a freely moving mouse. This in vivo method enabled continuous measurement of melatonin secretion over a period of >20 days in individual CBA mice, with simultaneous recording of the locomotor activity. Pineal melatonin secretion was completely matched to the circadian change of locomotor activity, and for the light-induced phase shift, the shift of melatonin secretion was clearer than the shift of locomotor rhythm. This analysis allowed us to detect rhythm with a high sensitivity: two peaks of daily secretion were observed, with the first small peak at the day-night transition time and the second large peak at midnight. The large nighttime peak was suppressed by tetrodotoxin, a Na⁺ channel blocker, and enhanced by both phenylephrine and isoproterenol, alpha- and beta-adrenergic agonists, whereas daytime melatonin levels were not affected by tetrodotoxin infusion. This finding suggests that, in CBA mice, melatonin release at night is activated by adrenergic signaling from the superior cervical ganglion, but the enhancement of melatonin during daytime is not mediated by neuronal signaling.

Nakos, T., E. O. Ofek, P. Boumis, J. Cuypers, D. Sinachopoulos, E. van Dessel, A. Gal-Yam and J. Papamastorakis (2003). "A catalog of secondary photometric standard stars around gravitational lenses." Astronomy & Astrophysics **402**(3): 1157-1158.<Go to ISI>://000182452000042

We present a catalog of secondary photometric standard stars in the neighborhood of 14 gravitationally lensed quasars. These stars were verified to be non variable using long-term monitoring. The instrumental magnitudes of the new standard stars have been transformed to the Johnson-Cousins BV(RI)(c) photometric system. For ten gravitational lenses (GLs) we also provide the BV(RI)(c) mean magnitudes of the integrated flux of all the lens components, for the epochs of the photometric calibration.

Narita, T., J. E. Grindlay, P. F. Bloser and Y. Chou (2003). "X-ray dip monitoring of XB 1916-053." Astrophysical Journal **593**(2): 1007-1012.<Go to ISI>://000184823400031

We report on the long-term monitoring of X-ray dips from the ultracompact low-mass X-ray binary (LMXB) XB 1916-053. Roughly one-month interval observations were carried out with the Rossi X-ray Timing Explorer (RXTE) during 1996, during which the source varied between dim, hard states and more luminous, soft states. The dip spectra and dip light curves were compared against both the broadband luminosity and the derived mass accretion rate ((M)over dot). The dips spectra could be fitted by an absorbed blackbody plus cutoff power-law nondip spectral model, with additional absorption ranging from 0 to > 100 x 10⁽²²⁾ cm⁽⁻²⁾. The amount of additional blackbody absorption was found to vary with the source luminosity. Our results are consistent with an obscuration of the inner disk region by a partially ionized outer disk. The size of the corona, derived from the dip ingress times, was found to be similar to 10⁽⁹⁾ cm. The corona size did not correlate with the coronal temperature, but seemed to increase when ((M)over dot) also increased. We discuss our findings in the context of an evaporated accretion disk corona model and an ADAF-type model.

Neal, C. (2002). "From determinism to fractal processing, structural uncertainty, and the need for continued long-term monitoring of the environment: The case of acidification." Hydrological Processes **16**(12): 2481-2484.<Go to ISI>://000177662600012

Neilson, M. A., D. S. Painter, G. Warren, R. A. Hites, I. Basu, D. V. C. Weseloh, D. M. Whittle, G. Christie, R. Barbiero, M. Tuchman, O. E. Johansson, T. F. Nalepa, T. A. Edsall, G. Fleischer, C. Bronte, S. B. Smith and P. C. Baumann (2003). "Ecological monitoring for assessing the state of the nearshore and openwaters of the Great Lakes." Environmental Monitoring and Assessment **88**(1-3): 103-117.<Go to ISI>://000185100800005

The Great Lakes Water Quality Agreement stipulates that the Governments of Canada and the United States are responsible for restoring and maintaining the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem. Due to varying mandates and areas of expertise, monitoring to assess progress towards this objective is conducted by a multitude of Canadian and U. S. federal and provincial/state agencies, in cooperation with academia and regional authorities. This paper highlights selected long-term monitoring programs and discusses a number of documented ecological changes that indicate the present state of the open and nearshore waters of the Great Lakes.

Nichols, F. H. (2003). "Interdecadal change in the deep Puget Sound benthos." *Hydrobiologia* **493**(1-3): 95-114.<Go to ISI>://000184957700009

Data from quantitative samples of the benthos at a 200-m site in central Puget Sound, collected twice yearly in most years between 1963 and 1992, were evaluated to determine the extent to which species composition in a continental-shelf depth community exhibits long-term persistence. Study results showed that the most abundant species were consistently present over the 30-year period. However, measures of species composition (e.g., similarity, diversity) reveal a subtle, gradual change in the community over time. Among the changes are (1) multi-year periods of greatly increased abundance of the common species; (2) an overall increase in the total abundance of the benthic community beginning in the mid-1970s; (3) periods of increased abundance, during the late 1970s and early 1980s, of two species that are tolerant of organic enrichment; and (4) the steady decline in abundance of the large burrowing echinoderm, *Brisaster latifrons* as a consequence of the lack of recruitment to the site since 1970. Despite the conspicuousness of these changes, there are no observed environmental factors that readily explain them. Circumstantial evidence suggests that climate-related change in Puget Sound circulation beginning in the mid-1970s, organic enrichment associated with a nearby large source of primary-treated sewage, and the influence of changes in the abundance of the large echinoderms on the smaller species are potential agents of change. The principle reasons for our inability to identify causes of long-term change in the Puget Sound benthos are (a) inconsistent long-term monitoring of environmental variables, (b) the lack of quantitative information about long-term changes in plankton and fish populations, (c) lack of knowledge of specific predator/prey and competitive interactions in soft bottom benthos, (d) unknown influence of moderate levels of contamination on biota; and (e) lack of understanding of possible linkages between climate regime shifts and fluctuations in local biological populations.

Nicolini, A., A. Carpi, P. Ferrari, G. Tartarelli, L. Anselmi, M. R. Metelli, I. Gorini, C. Spinelli, P. Miccoli and R. Giardino (2002). "Long-term monitoring of cell-mediated immunity in disease-free breast cancer patients: a preliminary retrospective study." *Biomedicine & Pharmacotherapy* **56**(7): 339-344.<Go to ISI>://000178575100004

In 102 N- and 44 N+ disease-free breast cancer patients, lymphocytic populations and skin reaction of delayed hypersensitivity (SRDH) were monitored up to 266 months after mastectomy to find out whether they were similar or different from control values. In two selected groups of 34 N- and 11 N+ breast cancer patients, the whole 10 year follow-up was divided into three subintervals, each of them lasting 40 months and the time course of lymphocytic populations was evaluated. In the 102 N- patients, mean CD4+, CD8+, CD3+ values were lower ($P < 0.01$, $P < 0.001$, $P < 0.01$, respectively) while CD4+/CD8+ ratio was higher ($P < 0.05$) than in controls. Fifteen N- breast cancer patients (16%) were anergic compared to 30 (32%) of controls ($P < 0.05$). In the 34 selected N- breast cancer patients soon after mastectomy the mean value of CD4+, CD8+, CD3+ T subpopulations was lower ($P < 0.01$, $P < 0.001$, $P < 0.01$, respectively) than in controls. Successively their mean value increased so that in the last subinterval they were not or were only slightly lower (P n.s., $P < 0.05$, $P < 0.05$, respectively) than in controls. In the 44 N+ patients, mean CD4+, CD8+, CD3+ values were lower ($P < 0.001$, $v < 0.05$, $P < 0.01$, respectively) and CD19+ lymphocytes higher ($P < 0.001$) than in controls. Five N+ breast cancer patients (13%) were anergic compared to 32% of controls ($P < 0.05$). In the 11 selected N+ breast cancer patients soon after mastectomy, the mean value of CD4+, CD8+ T subpopulations and CD16+56+ cells was significantly lower ($P < 0.001$, $P < 0.001$, $P < 0.01$, respectively) than in controls. Successively their mean value constantly increased so that in the last subinterval, no or slight (P n.s., $P < 0.05$, P n.s., respectively) significant difference compared to controls occurred. The mean CD4+/CD8+ ratio value of N- patients was significantly higher than in controls. However in the last subinterval, the significance was lower than in the first one ($P < 0.05$ and $P < 0.01$, respectively). In the N+ patients, the mean value of CD4+/CD8+ ratio was constant, although not significantly, lower than in controls; however it progressively increased from the first to the last subinterval. Therefore the significance of the difference of the mean CD4+/CD8+ ratio between N- and N+ patients strongly decreased from the first to the last subinterval ($P < 0.001$ and $P < 0.05$, respectively). These data indicate that in breast cancer patients, following mastectomy, a significant activation of memory and CD4+ T cells and long-term decrease of the circulating immunocompetent CD4+, CD8+ and CD 16+56+ cells occurs. The prolonged disease-free interval observed in the 34 N- and 11 N+ breast cancer patients can be correlated with the restoration of the normal state of cell-mediated immunity. (C) 2002 Editions scientifiques et medicales Elsevier SAS. All rights reserved.

Ning, S. K. and N. B. Chang (2004). "Optimal expansion of water quality monitoring network by fuzzy optimization approach." *Environmental Monitoring and Assessment* **91**(1-3): 145-170.<Go to ISI>://000187353700007

River reaches are frequently classified with respect to various mode of water utilization depending on the quantity and quality of water resources available at different location. Monitoring of water quality in a river system must collect both temporal and spatial information for comparison with respect to the preferred situation of a water body based on different scenarios. Designing a technically sound monitoring network, however, needs to identify a suite of significant planning objectives and consider a series of inherent limitations simultaneously. It would rely on applying an advanced systems analysis technique via an integrated simulation-optimization approach to meet the ultimate goal. This article presents an optimal expansion strategy of water quality monitoring stations for fulfilling a long-term monitoring mission under an uncertain environment. The planning objectives considered in this analysis are to increase the protection degree in the proximity of the river system with higher population density, to enhance the detection capability for lower compliance areas, to promote the detection sensitivity by better deployment and installation of monitoring stations, to reflect the levels of utilization potential of water body at different locations, and to monitor the essential water quality in the upper stream areas of all water intakes. The constraint set contains the limitations of budget, equity implication, and the detection sensitivity in the water environment. A fuzzy multi-objective evaluation framework that reflects the uncertainty embedded in decision making is designed for postulating and analyzing the underlying principles of optimal expansion strategy of monitoring network. The case study being organized in South Taiwan demonstrates a set of more robust and flexible expansion alternatives in terms of spatial priority. Such an approach uniquely indicates the preference order of each candidate site to be expanded step-wise whenever the budget limitation is sensitive in the government agencies.

Oakley, K. L., L. P. Thomas and S. G. Fancy (2003). "Guidelines for long-term monitoring protocols." *Wildlife Society Bulletin* **31**(4): 1000-1003.<Go to ISI>://000188299100009

Monitoring protocols are detailed study plans that explain how data are to be collected, managed, analyzed, and reported, and are a key component of quality assurance for natural resource monitoring programs. Protocols are necessary to ensure that changes detected by monitoring actually are occurring in nature and not simply a result of measurements taken by different people or in slightly different ways. We developed and present here guidelines for the recommended content and format of monitoring protocols. The National Park Service and United States Geological Survey have adopted these guidelines to assist scientists developing protocols for more than 270 national park units.

O'Donnell, C. F. J. (2002). "Variability in numbers of long-tailed bats (*Chalinolobus tuberculatus*) roosting in Grand Canyon Cave, New Zealand: implications for monitoring population trends." *New Zealand Journal of Zoology* **29**(4): 273-284. <Go to ISI>://000180313400001

Counts of roosting bats undertaken within caves are used frequently as indicators of population size, long-term indices of population trends, and as measures of response to management. Numbers of New Zealand long-tailed bats (*Chalinolobus tuberculatus* Forster 1844) using Grand Canyon Cave were monitored over 8 years. Grand Canyon Cave is a focal point for one of the largest known populations. It has been used by long-tailed bats consistently for >40 years. The aims of this study were to examine the utility of cave-roost counts for long-term monitoring of population trends in this threatened species, and to establish a baseline for future monitoring. Two population indices, number of bats counted roosting inside the cave during the day and net number emerging at dusk, were not significantly different. Monthly and daily counts were characterised by high variability. Indices varied significantly through the year but not between years. Distribution of bats within the cave was not random. Bats avoided roosting within 30 in of each entrance and larger groups were always concentrated along two 50 in stretches of cave ceiling. Large groups occurred when cave temperatures ranged from 10-13degreesC, suggesting an optimum temperature range. Maximum counts of 250 (day roosting) and 358 (night roosting) bats confirm that Grand Canyon Cave is significant as a site for *C. tuberculatus*. Counts can be used as a baseline against which to judge future trends in the population of *C. tuberculatus* at Grand Canyon Cave and contribute to national monitoring of bat populations. Effects of variation can be overcome with standardisation of repeat counts, adopting a sampling frequency that provides sufficient power to detect changes, and use of statistical models that separate sampling effects from variance in bat activity. Recommendations for future monitoring are made.

Ong, K. G., M. Paulose and C. A. Grimes (2003). "A wireless, passive, magnetically-soft harmonic sensor for monitoring sodium hypochlorite concentrations in water." *Sensors* **3**(1): 11-18. <Go to ISI>://000182272800002

A wireless, passive, remote-query sensor for monitoring sodium hypochlorite (bleach) solutions is reported. The sensor is comprised of a magnetically-soft ferromagnetic ribbon, coated with a layer of polyurethane and alumina, having a large and nonlinear permeability that supports higher-order harmonics in response to a time varying magnetic field. The hypochlorite ions induce swelling in the coating, with the resultant stress altering the harmonic signature of the sensor from which the sodium hypochlorite concentration can be determined. The wireless, passive nature of the sensor platform enables long-term monitoring of bleach concentrations in the environment. The sensor platform can be extended to other chemical analytes of interest as desired.

Orsini, A. N., T. J. Koliass, K. R. Strellich and W. F. Armstrong (2003). "Feasibility of transesophageal echocardiography with a ten-French monoplane probe." *Journal of the American Society of Echocardiography* **16**(6): 682-687. <Go to ISI>://000183510500012

Objectives. We examined the feasibility of transesophageal echocardiography (TEE) using a 10F monoplane probe developed for intracardiac ultrasound (AcuNav, Acuson/Siemens, Mountain View, Calif). **Background:** Traditional TEE uses a 10- to 12-mm-diameter probe, and conscious sedation is customary to minimize patient discomfort. Because of its small size (3.2-mm diameter), the 10F monoplane probe can be inserted into the esophagus using only topical anesthesia. This provides the potential for a more easily tolerated examination. **Methods.** A total of 20 patients underwent a comprehensive TEE using an adult multiplane probe. Immediately afterward, the 10F monoplane probe was inserted into the esophagus and a targeted examination completed. The 10F monoplane studies were blindly reviewed by 3 observers for the study indication and for 16 diagnostic elements. These were graded against an expert's review of standard TEE. **Results.** The 10F monoplane probe was well tolerated in all patients. Observers A, B, and C answered the clinical question in 80%, 85%, and 100%, respectively, with the 10F probe. The percentage of clinical elements deemed evaluable was 71%, 78%, and 80%, respectively. Limitations included incomplete visualization of the mitral valve and a systematic underestimation of the severity of valve regurgitation. **Conclusions:** The 10F monoplane probe is safe, well-tolerated, and capable of evaluating many clinical questions. Because of its small size, conscious sedation may not be necessary. It may be useful for targeted evaluations, for monitoring invasive procedures, or for intermediate or long-term monitoring in an intensive care department. (*J Am Soc Echocardiogr* 2003;16:682-7.)

Orvik, K. A. and O. Skagseth (2003). "Monitoring the Norwegian Atlantic slope current using a single moored current meter." *Continental Shelf Research* **23**(2): 159-176. <Go to ISI>://000180761600002

Monitoring the Atlantic inflow (AI) of warm and saline water into the Nordic Seas (Norwegian, Greenland and Iceland Seas) is of great importance because of its impact on climate and ecology in Northern Europe and Arctic. In this study, an observation system for establishment of simple, robust and cost effective monitoring of the AI is validated in the Svinoy section, cutting through the AI just to the north of the Faroe-Shetland Channel. We concentrate on the eastern branch of the AI, the Norwegian Atlantic Slope Current (NwASC), an about 40 km wide flow along the steep Norwegian slope. The database is an array of 15 current meters on 4 moorings covering the NwASC over a 2-year period 1998-2000. We test the hypothesis that long-term monitoring of the NwASC can be performed by using one single current meter suitable placed in the flow. The volume flux can then be estimated by construction of simple regression models using the single current meter record as the independent variable. For validation of statistical properties as stability, confidence and stationarity, the time series is split into two 1-year segments: a model period and a test period. Gridded correlation fields between currents and volume transport show correlation maxima in the core of the NwASC, ranging from 0.84 on a daily timescale to 0.97 on a monthly timescale. A more comprehensive correlation/coherence analysis for each current meter record against volume transport on 7-day timescales, enable us to choose the optimal current meter for a linear regression model with (correlation, slope) coefficients of (0.87, 0.13) for the model period and (0.80, 0.13) for the test period. The

similarity of the statistical properties for the model and test periods substantiates the stationarity, stability and robustness of the model. A linear regression model underestimates large fluxes and is thus extended to a second degree polynomial. This improves the curve fitting for strong currents with a minor increase in overall correlation, but is more sensitive and less stable. Overall, we find a linear regression model to be more robust and applicable for monitoring the NwASC. The applicability of a linear regression model as an estimator for volume flux of the NwASC is demonstrated using a 2-year time series, and validated against calculated transport. The calculated transport agrees with the statistical analysis and reveals a noisy fit on daily timescale, while the curves coincide well on both 7- and 30-day timescales with correlation coefficients of 0.84 and 0.86, respectively. On all timescales, the calculated and model transport give an overall mean flow of 4.4 Sv and show fluctuations on timescales of days to months, with the seasonal cycle being the most prominent. (C) 2002 Elsevier Science Ltd. All rights reserved.

Park, J. H., M. J. Mitchell, P. J. McHale, S. F. Christopher and T. P. Meyers (2003). "Impacts of changing climate and atmospheric deposition on N and S drainage losses from a forested watershed of the Adirondack Mountains, New York State." Global Change Biology **9**(11): 1602-1619.<Go to ISI>://000186387400008

Biogeochemical responses to changing climate and atmospheric deposition were investigated using nitrogen (N) and sulfur (S) mass balances, including dry deposition and organic solutes in the Arbutus Lake watershed in the Adirondack Mountains, New York State. Long-term monitoring of wet-only precipitation (NADP/NTN, 1983-2001) and dry deposition (AIRMoN, 1990-2001) at sites adjacent to the watershed showed that concentrations of SO₄²⁻ in precipitation, SO₄²⁻ in particles, and SO₂ vapor all declined substantially ($P < 0.005$) in contrast to no marked temporal changes observed for most N constituents (NH₄⁺ in precipitation, HNO₃ vapor, and particulate NO₃⁻), except for NO₃⁻ in precipitation, which showed a small decrease in the late 1990s. From 1983 to 2001, concentrations of SO₄²⁻ in the lake outlet significantly decreased (-2.1 $\mu\text{eq L}^{-1} \text{yr}^{-1}$, $P < 0.0001$), whereas NO₃⁻ and dissolved organic N (DON) concentrations showed no consistent temporal trends. With the inclusion of dry deposition and DON fluxes into the mass balance, the retained portion of atmospheric N inputs within the main subcatchment increased from 37% to 60%. Sulfur outputs greatly exceeded inputs even with the inclusion of dry S deposition, while organic S flux represented another source of S output, implying substantial internal S sources. A significant relationship between the annual mean concentrations of SO₄²⁻ in lake discharge and wet deposition over the last two decades ($r = 0.64$, $P < 0.01$) suggested a considerable influence of declining S deposition on surface water SO₄²⁻ concentrations, despite substantial internal S sources. By contrast, interannual variations in both NO₃⁻ concentrations and fluxes in lake discharge were significantly related to year-to-year changes in air temperature and runoff. Snowmelt responses to winter temperature fluctuations were crucial in explaining large portions of interannual variations in watershed NO₃⁻ export during the months preceding spring snowmelt (especially, January-March). Distinctive response patterns of monthly mean concentrations of NO₃⁻ and DON in the major lake inlet to seasonal changes in air temperature also suggested climatic regulation of seasonal patterns in watershed release of both N forms. The sensitive response of N drainage losses to climatic variability might explain the synchronous patterns of decadal variations in watershed NO₃⁻ export across the northeastern USA.

Pastoret, P. P., D. Boulanger and B. Brochier (1995). Potential long term ecological impacts of the release of a recombinant vaccinia-rabies virus for wildlife vaccination against rabies. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press. pp 183-195

Paterson, A. M., B. F. Cumming, J. P. Smol and R. I. Hall (2004). "Marked recent increases of colonial scaled chrysophytes in boreal lakes: implications for the management of taste and odour events." Freshwater Biology **49**(2): 199-207.<Go to ISI>://000188224600007

1. Lake managers suspect that taste and odour-causing algal blooms are increasing in frequency and intensity, although long-term monitoring records are scarce, and a number of critical scientific and management questions remain unanswered. 2. In nutrient-poor lakes and reservoirs, these events are caused primarily by sporadic outbreaks of some chrysophyte algae, which leave identifiable markers in lake sediments. We examine the siliceous remains of these organisms in more than fifty boreal lakes at broad temporal and spatial scales. 3. Colonial scaled chrysophytes, including the taste and odour-causing *Synura petersenii*, have increased markedly in more than 90% of the lakes examined since pre-industrial times. 4. Detailed stratigraphic analyses of two lakes show a rise in the abundance of colonial taxa in the 1930s to 1950s, with a sharp increase over the past two decades. 5. An examination of biogenic silica and biological ratios in Crosson Lake, Ontario, Canada, indicate that these changes represent true increases in the absolute abundance of colonial chrysophytes. 6. Rapid increases over the past two decades indicate that these trends are the result of one or more anthropogenic stressors that are operating at a broad, regional scale.

Pearce, P., W. Parker and P. Van Geel (2002). "Long term monitoring of hydrocarbon contamination using multi-level vapor phase piezometers." Environmental Forensics **3**(2): 163-177.<Go to ISI>://000178697300007

This study evaluated the feasibility of supplementing groundwater monitoring protocols by assessing the vadose zone for the extent of residual subsurface contamination. The study also characterized the response of the soil gas signatures with respect to different soil types and degrees of contamination. A field study was conducted at a former gasoline vending station located in Ottawa, Canada. The current state of contamination was determined by analysis of soil samples taken from boreholes. A series of 10 nested soil gas wells with monitoring depths of 0.75, 1.5, 2.25 and 3.0 m were then installed. Using these wells, soil gas surveys were performed at regular intervals over an extended period to quantify Gaseous TPH (TPHg), oxygen and carbon dioxide concentrations in the soil gas. Results indicate that soil gas wells located near the source term exhibited characteristic soil gas signatures and significant fluctuations in TPHg, oxygen and carbon dioxide concentrations with time. Soil gas wells located beyond the soil contamination demonstrated limited correlation between TPH oxygen and carbon dioxide concentrations and decreased seasonal variability. (C) 2002 AEHS. Published by Elsevier Science Ltd. All rights reserved.

Pelto, M. S. and P. Hartzell (2004). "Change in longitudinal profile on three North Cascades glaciers during the last 100 years." Hydrological Processes **18**(6): 1139-1146.<Go to ISI>://000220735100008

Centreline surface elevation longitudinal profiles have been completed for three different points in time from historic photographs (similar to 1900), US Geological Survey maps (1964 and 1985), and field measurements (annually between 1984 and the present) for three North Cascade glaciers. Comparison of thinning and terminus behaviour over this time period indicates substantial overall volume loss during this century for each glacier. Mean thickness changes along the longitudinal profile of Easton Glacier are losses of 46 m (0.68 m year⁻¹) of ice thickness between 1916 and 1994 and 13 m (0.172 m year⁻¹) between 1984 and 2002. Its terminus has retreated a net distance of 2123 m. Lower Curtis Glacier lost an average of 45 m (0.60 m year⁻¹) thickness from 1908 to 1984 and 6 m (0.033 m year⁻¹) from 1984 to 2002, with a net terminus retreat of 522 m. On Columbia Glacier, ice thickness loss was 57 m (0.178 m year⁻¹) from 1911 to 1984 and 8 m (0.144 m year⁻¹) from 1984 to 2002. The net terminus retreat for Columbia was 640 m. Thickness changes are approximately equal in the accumulation zone of the Columbia and Lower Curtis Glacier during the 20th century and from 1984 to 2002. This suggests that there is no position to which the glacier can retreat and achieve equilibrium. The changes on each glacier, which today average less than 75 m in thickness, represent the loss of 35-50% in their volume since the turn of the century, and 10-15% of this volume since 1984. Their ongoing thinning indicates that these three glaciers will continue to retreat in the foreseeable future, the Columbia Glacier likely disappearing. Long-term monitoring of these glaciers should continue in order to assess the impact on downstream flow, which is utilized for hydropower on Easton and Lower Curtis Glaciers and a salmon hatchery on Columbia Glacier. Copyright (C) 2004 John Wiley Sons, Ltd.

Pesaro, M. and F. Widmer (2006). "Identification and specific detection of a novel Pseudomonadaceae cluster associated with soils from winter wheat plots of a long-term agricultural field experiment." *Applied and Environmental Microbiology* **72**(1): 37-43. <Go to ISI>://000234662800003

The genus *Pseudomonas* (sensu stricto) represents a group of microorganisms directly involved in functions conferring plant health. We performed a study in the DOK long-term agricultural field experiment on the basis of previously published *Pseudomonas*-selective PCR primers in order to investigate the community structure of the microbial groups defined by the target range of these primers. Three different agricultural management systems, i.e., conventional, biodynamic, and bio-organic, along with mineral and unfertilized controls were investigated, with each system planted with either winter wheat or a grass-clover ley. Amplified small-subunit rRNA gene fragments were analyzed using the genetic profiling techniques restriction fragment length polymorphism (RFLP) and denaturing gradient gel electrophoresis (DGGE), revealing distinct differences between soils planted with winter wheat and grass clover but only minor differences between the management systems. Phylogenetic analyses of 59 clone sequences retrieved from bio-organic and unfertilized systems identified sequences related to *Pseudomonas fluorescens* and a novel cluster termed Cellvibrio-related Pseudomonadaceae (CRP). The CRP clones were exclusively isolated from winter wheat soil samples and were responsible for the crop-specific differences observed in RFLP and DGGE profiles. New primers were designed for the amplification of CRP targets directly from soil DNA, yielding strong signals exclusively for winter wheat soils. We concluded that crop-associated CRP exist in agricultural soils and that genetic profiling followed by specific probe design represents a valuable approach for identification as well as sensitive and rapid monitoring of novel microbial groups in the environment.

Peschke, H. (1997). "Long-term experiments with N-15 in crop research." *Isotopes in Environmental and Health Studies* **33**(1-2): 3-11. <Go to ISI>://000072536800002

The nitrogen research contributes significantly in different ways to crop sciences. By the application of the N-15 tracer technique additional informations are obtained, especially during long-term trials. Three models are represented: 1. N-15 utilization and N-15 after-effects 2. N-15 enrichment and N-15 depletion in one system 3. Monitoring a N-15 chain over several compartments.

Pfafferott, J., S. Herkel and M. Jaschke (2003). "Design of passive cooling by night ventilation: evaluation of a parametric model and building simulation with measurements." *Energy and Buildings* **35**(11): 1129-1143. <Go to ISI>://000187782200006

At the new institute building of Fraunhofer ISE, both mechanical and free night ventilation is used for passive cooling of the offices. The results from a long-term monitoring show, that room temperatures are comfortable even at high ambient air temperatures. In two offices, experiments were carried out in order to determine the efficiency of night ventilation dependent on air change rate, solar and internal heat gains. The aim is to identify characteristic building parameters and to determine the night ventilation effect with these parameters. The experiments (one room with and one without night ventilation) are evaluated by using both a parametric model and the ESP-r building simulation programme. Both models are merged in order to develop a method for data evaluation in office buildings with night ventilation and to provide a simple model for integration in a building management system. (C) 2003 Elsevier B.V. All rights reserved.

Pla, C. (1995). *Ecological effects of genetically modified fish: an overview*. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press. pp 217-222

Popa, M. V., E. Vasilescu, P. Drob, I. Demetrescu, B. Popescu, D. Ionescu and C. Vasilescu (2003). "In vitro assessment and monitoring of the implant titanium materials - physiological environment interactions." *Materials and Corrosion-Werkstoffe Und Korrosion* **54**(4): 215-221. <Go to ISI>://000182695200001

Long-term monitoring (for 8000 exposure hours) of titanium and its implant alloys (Ti-5Al-4V, Ti-6Al-4Fe) interactions with Ringer's solutions of different pH-values (2.5, 4.35, 6.98), simulating various conditions that can appear at the contact between implant and tissues was carried out in this paper. All data were statistics treated using Medcalc program. In vitro electrochemical behaviour of titanium and its alloys reveals their self-passivation in Ringer's solutions. Monitoring of the open circuit potentials with time and pH have shown that the passive films on the implant materials studied were very stable for all tested periods. Interactions due to the non-uniformity of the physiological electrolyte pH can not produce any form of local corrosion. The tested materials present low corrosion rates which attest their very good stability for 8000 exposure hours in simulated biological environment. Surface topography characterisation using atomic force microscopy (AFM) data, correlated with the electrochemical parameters, were arguments for the stability of the samples in studied bioliquids.

Porter, J. H., M. L. Parry and T. R. Carter (1991). "The Potential Effects of Climatic-Change on Agricultural Insect Pests." Agricultural and Forest Meteorology 57(1-3): 221-240.<Go to ISI>://A1991GW14400015

Climate and weather can substantially influence the development and distribution of insects. Anthropogenically induced climatic change arising from increasing levels of atmospheric greenhouse gases would, therefore, be likely to have a significant effect on agricultural insect pests. Current best estimates of changes in climate indicate an increase in global mean annual temperatures of 1-degrees-C by 2025 and 3-degrees-C by the end of the next century. Such increases in temperature have a number of implications for temperature-dependent insect pests in mid-latitude regions. Changes in climate may result in changes in geographical distribution, increased overwintering, changes in population growth rates, increases in the number of generations, extension of the development season, changes in crop-pest synchrony, changes in interspecific interactions and increased risk of invasion by migrant pests. To illustrate some of these effects, results of a study investigating the impact of climatic change on the European corn borer (*Ostrinia nubilalis*) in Europe are shown. Under the climatic changes projected by the Goddard Institute for Space Studies general circulation model, northward shifts in the potential distribution of the European corn borer of up to 1220 km are estimated to occur, with an additional generation found in nearly all regions where it is currently known to occur. A number of priorities for future research into the effects of climatic changes on agricultural insect pests can be identified. These include: examination of the influence of climatic variables on insect pests, long-term monitoring of pest population levels and insect behaviour, consideration of possible climatic changes in research into pest management systems and identification of potential migrants.

Possee, R. D. (1995). Risk Assessment and Field Trial with a Genetically Modified Baculovirus Insecticide. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press.pp 147-163

Powell, G. L., J. Matsumoto and D. A. Brock (2002). "Methods for determining minimum freshwater inflow needs of Texas Bays and estuaries." Estuaries 25(6B): 1262-1274.<Go to ISI>://000180611400003

In response to legislative directives beginning in 1975, the Texas Water Development Board (TWDB) and the Texas Parks and Wildlife Department (TPWD) jointly established and currently maintain a data collection and analytical study program focused on determining the effects of and needs for freshwater inflows into the state's 10 bay and estuary systems. Study elements include hydrographic surveys, hydrodynamic modeling of circulation and salinity patterns, sediment analyses, nutrient analyses, fisheries analyses, freshwater inflow optimization modeling, and verification of needs. For determining the needs, statistical regression models are developed among freshwater inflows, salinities, and coastal fisheries. Results from the models and analyses are placed into the Texas Estuarine Mathematical Programming (TxEMP) model, along with information on salinity viability limits, nutrient budgets, fishery biomass ratios, and inflow bounds. The numerical relationships are solved within the constraints and limits, and optimized to meet state management objectives for maintenance of biological productivity and overall ecological health. Solution curves from the TxEMP model are verified by TWDB's hydrodynamic simulation of estuarine circulation and salinity structure, which is evaluated against TPWD's analysis of species abundance and distribution patterns in each bay and estuary system. An adequate system-wide match initially verifies the inflow solution. Long-term monitoring is recommended in order to verify that implementation of future water management strategies maintain ecological health of the estuaries and to provide an early warning of needs for adaptive management strategies.

Pretzsch, H. (2003). "Strategic planning of sustainable development on the estate level - Contributions from forest growth and yield science." Forstwissenschaftliches Centralblatt 122(4): 231-249.<Go to ISI>://000185203400003

At the beginning of regular forestry and systematic forest science the focus of sustainable management was on wood production (v. CARLOWITZ 1713, COTTA 1828, HARTIG 1804, HUNDESHAGEN 1826). Subsequently more and more forest functions were considered in management and planning (V. HAGEN 1867, DIETRICH 1957). Our current understanding of multifunctional forest development is reflected in the six Pan-European criteria and corresponding indicators for sustainable forestry (MCPFE 2000). The present paper Outlines how these criteria and indicators can be applied for certification and strategic planning of sustainable development on the level of operational forests and how forest growth and yield science might Support this intention. Forestry in Germany, is blessed with an excellent database gathered during forest inventories and long- term monitoring. For example, we demonstrate how additional use can be made of the database for more efficient extraction Of relevant pan-European criteria and indicators. An important Field of application of this database is monitoring and certification of forest development. The creative power of these criteria and indicators can be unfolded by integrating them in strategic forest planning. For the purpose of strategic planning growth models, simulators and decision support systems are available. If these tools cover the relevant criteria and indicators they enable multicriteria scenario analysis and optimisation of management options on estate level. Concepts and tools for multicriteria oriented strategic planning are available (v. GADOW 2003, HANEWINKEL 2001, PRETZSCH et al. 1998, SPELLMANN et al. 2001), their transfer into forest management would trigger considerable innovation.

Putzer, M., W. J. Barry, J. R. Moringlane, G. Fuss, J. Spiegel, U. Dillmann and H. Sittinger (2003). "Effect of deep brain stimulation on glottal phonation in patients with Parkinson's disease and multiple sclerosis." Folia Phoniatica Et Logopaedica 55(5): 220-232.<Go to ISI>://000185199900002

The present study examines the effect of neurostimulatory operations on glottal phonation of 3 parkinsonian patients and 3 patients with multiple sclerosis. With the help of two voice analysis programs (MDVP from Kay Elemetrics and EEG Program by Marasek) for the acoustic and electroglottographic definition of voice characteristics, vowel productions of the patients, which were recorded under two conditions (with and without stimulation), were analysed. In a first step, significantly different intrasubject means in the two conditions indicate the effect of neurostimulation. The strength of the effect differs among subjects, particularly in the case of patients with Parkinson's disease. In a second step, a gender-differentiated comparison of the individual patient's data (recorded with and without stimulation) with a group of normal voice speakers (150 male and 150 female speakers) is carried out. This intersubject comparison proves useful in that it relativizes the results from the intrasubject comparison. It is shown for the parkinsonian patients that stimulation causes a relative deterioration of the glottal cycle, while for the patients with multiple sclerosis a tendency for hyperfunctional

phonation is observed. In the latter case, the results suggest the need for long-term monitoring of phonation behaviour during chronic electrical stimulation. Copyright (C) 2003 S. Karger AG, Basel.

Raber, E., T. M. Carlsen, K. J. Folks, R. D. Kirvel, J. I. Daniels and K. T. Bogen (2004). "How clean is clean enough? Recent developments in response to threats posed by chemical and biological warfare agents." International Journal of Environmental Health Research **14**(1): 31-41.<Go to ISI>://000186923700003

Recent terrorist events underscore the urgent need to develop a comprehensive set of health-protective cleanup standards and effective decontamination technologies for use in the restoration of civilian facilities. Accurate scientific information remains limited in the area of biological warfare agents. However, new guidelines and calculated cleanup values are emerging for initial re-entry and long-term reoccupation following use of chemical warfare agents. This article addresses airborne, soil, and surface exposures following release of G-type chemical warfare agents and VX. Cleanup goals should be tailored to the type of population that may be exposed, potential exposure times, and other scenario-specific considerations. Three different airborne concentrations are proposed for cleanup of public sector facilities. One value is recommended for initial re-entry; a more conservative value is recommended for long-term monitoring and increased public confidence; and a third, even more conservative concentration represents essentially a no-effect level for round-the-clock airborne exposure. Health-based cleanup levels are provided for contaminated residential and industrial soil. Results are presented on the outcome of a preliminary risk assessment to determine safe surface levels (e.g., walls, floors, and handrails) for cleanup after exposure to the G agents and VX. Because specific cleanup criteria for most biological warfare agents remain problematic, recommendations are made for filling the knowledge gaps.

Ragauskas, A., G. Daubaris, V. Ragaisis and V. Petkusa (2003). "Implementation of non-invasive brain physiological monitoring concepts." Medical Engineering & Physics **25**(8): 667-678.<Go to ISI>://000185379200006

The paper presents innovative methods and technology for non-invasive intracranial hemodynamics monitoring based on the measurement of brain parenchyma acoustic properties. The clinical investigation of new technology shows the similarity between the invasively recorded intracranial pressure (ICP) and non-invasively recorded intracranial blood volume (IBV) pulse waves, slow waves and slow trends under intensive care unit (ICU) conditions. Also, the applicability of the non-invasive IBV slow wave monitoring technique for cerebrovascular autoregulation non-invasive long-term monitoring is demonstrated by theoretical and experimental studies. (C) 2003 IPPEM. Published by Elsevier Ltd. All rights reserved.

Raman, T. R. S. and D. Mudappa (2003). "Correlates of hornbill distribution and abundance in rainforest fragments in the southern Western Ghats, India." Bird Conservation International **13**(3): 199-212.<Go to ISI>://000186097500003

The distribution and abundance patterns of Malabar Grey Hornbill *Ocyrceros griseus* and Great Hornbill *Buceros bicornis* were studied in one undisturbed and one heavily altered rainforest landscape in the southern Western Ghats, India. The Agasthyamalai hills (Kalakad-Mundanthurai Tiger Reserve, KMTR) contained over 400 km² of continuous rainforest, whereas the Anamalai hills (now Indira Gandhi Wildlife Sanctuary, IGWS) contained fragments of rainforest in a matrix of tea and coffee plantations. A comparison of point-count and line transect census techniques for Malabar Grey Hornbill at one site indicated much higher density estimates in point-counts (118.4/km²) than in line transects (51.5/km²), probably due to cumulative count over time in the former technique. Although line transects appeared more suitable for long-term monitoring of hornbill populations, point-counts may be useful for large-scale surveys, especially where forests are fragmented and terrain is unsuitable for line transects. A standard fixed radius point-count method was used to sample different altitude zones (600-1,500 m) in the undisturbed site (342 point-counts) and fragments ranging in size from 0.5 to 2,500 ha in the Anamalais (389 point-counts). In the fragmented landscape, Malabar Grey Hornbill was found in higher altitudes than in KMTR, extending to nearly all the disturbed fragments at mid-elevations (1,000-1,200 m). Great Hornbill persisted in the fragmented landscape using all three large fragments (> 200 ha). It was also recorded in four of five medium-sized fragments (25-200 ha) and one of five small fragments (< 25 ha), which was adjacent to shade coffee plantations. Abundance of Malabar Grey Hornbill declined with altitude and increased with food-tree species richness. Great Hornbill abundance increased with food-tree species richness, suggesting that maintenance of high diversity of hornbill food species in fragments is important for their persistence. It is likely that the smaller and less specialized Malabar Grey Hornbill will survive in disturbed and fragmented forest landscapes, while Great Hornbill is more vulnerable to habitat alteration. Protection and restoration of rainforest fragments and food-tree resources, besides protection of existing large fragments, will aid the conservation of hornbills in the region.

Ramirez, S. P. B., S. I. H. Hsu and W. McClellan (2003). "Taking a public health approach to the prevention of end-stage renal disease: The NKF Singapore Program." Kidney International **63**: 61-65.<Go to ISI>://000180419700013

The National Kidney Foundation Singapore (NKFS) provides subsidized dialysis care to approximately 70% of the country's total end-stage renal disease (ESRD) population, based entirely on charitable donations. Because of the exponential increase in prevalent dialysis patients receiving care through the NKFS' chronic dialysis program, and with the anticipated epidemic rise in incident ESRD patients, an accelerated comprehensive strategy for the prevention of renal and its associated chronic diseases was developed. Presented is the NKFS' public health plan, which incorporates primary, secondary and tertiary approaches to the prevention of chronic kidney disease. Components of this comprehensive strategy include: screening populations at risk for the development and progression of renal disease, the documentation of existing standards of care for chronic diseases associated with renal disease, and the institution of disease management programs that facilitate the systematic management of patients with chronic diseases that lead to ESRD, including the development of community-based "Prevention Centers." Finally, longitudinal follow-up of the participating population is being performed in order to provide benchmarks for improvement and to determine future directions of the program. Such long-term monitoring also will facilitate the establishment of its efficacy in improving clinical outcomes, reducing the cost of care, and delaying the development and progression of chronic kidney disease.

Rao, C. S., A. S. Rao, A. Swarup, S. K. Bansal and V. Rajagopal (2000). "Monitoring the changes in soil potassium by extraction procedures and electroultrafiltration (EUF) in a Tropaequet under twenty years of rice-rice cropping." Nutrient Cycling in Agroecosystems **56**(3): 277-282.<Go to ISI>://000086648500008

Chemical extraction procedures and electroultrafiltration (EUF) fractions were evaluated for measuring the changes in soil K in a Tropaquet as a consequence of continuous fertilizer use and rice-rice cropping for 20 years in a long-term fertilizer experiment. During the course of 20 years the gap in total K uptake by crops in treatments receiving K and those without an external K supply widened, indicating a stress on soil K reserves in the latter treatments. Readily available forms, i.e. water-soluble, 0.01 M CaCl₂, citric acid and ammonium acetate extractable K did not undergo much change. On the contrary, there was a conspicuous decrease in strongly held 3 M H₂SO₄ and 1 M boiling HNO₃ K (nonexchangeable K), as these forms replenished the soil solution K removed by the crop plants. Similarly, considerable decrease was noticed in EUF 30-35 K obtained at higher temperature and voltage, as it also represents nonexchangeable K in soils. NPK and NPK plus FYM arrested, to a greater extent, the depletion in soil K. Huge K removals, from 1000 to 3550 kg K ha⁻¹, by the rice crop in 20 years were not reflected in NH₄OAc K which is commonly used as a criterion for fertilizer K recommendations by the soil testing laboratories in India. The total K uptake by the rice crop during 20 years corresponded closely to the changes in nonexchangeable K as measured by 3 M H₂SO₄ and 1 M HNO₃. This suggests the need for including nonexchangeable K in soil test calibration for better K fertilizer recommendations in long-term operations.

Rao, M. R. and R. D. Coe (1991). "Measuring Crop Yields in on-Farm Agroforestry Studies." *Agroforestry Systems* **15**(2-3): 275-289. <Go to ISI>://A1991GR11200012

The paper describes the agronomic and statistical principles that form the basis for measuring crop yields in on-farm agroforestry studies. Agroforestry systems differ from agricultural systems because of the presence of tree/crop interfaces and the need for large plots, large borders and long-term monitoring. These differences accentuate the variability of crop performance on farms. Crop yield estimation per unit area in any agroforestry system involves essentially i) stratification of the plot into different, clearly distinguishable crop zones such as those under and free from the influence of trees, those on sloping and flat areas, and those on areas affected by pests, ii) drawing representative samples from each stratum, and iii) weighting the sample yields with weights proportional to the stratum area. The tree/crop interface areas may require further stratification and determination of yields of individual crop rows at different distances away from trees based on the nature and extent of tree/crop competition. The precision of yield estimation depends on how well one is able to define the strata as well as the variance of crop yields in space and time in each stratum. Studies that provide this information are urgently needed for developing practical recommendations for crop-yield measurements on farms.

Raucoules, D., C. Maisons, C. Camec, S. Le Mouelic, C. King and S. Hosford (2003). "Monitoring of slow ground deformation by ERS radar interferometry on the Vauvert salt mine (France) - Comparison with ground-based measurement." *Remote Sensing of Environment* **88**(4): 468-478. <Go to ISI>://000187347100009

The differential SAR Interferometry (DInSAR) technique has been applied to a test site near Vauvert (France) to detect and monitor ground deformation. This site corresponds to the location of an industrial exploitation of underground salt using the solution mining technique. An area of subsidence has been observed using in situ measurements. Despite conditions unfavorable for InSAR because of the vegetal cover, we show that radar remote sensing observations provide valuable information which substantially improves our knowledge of the phenomenon. An adaptive phase filtering process has been used to improve the coherence level. In particular, our study shows that the geometry of the subsidence bowl is different to that previously assumed using ground-based techniques only. The size of the subsidence bowl (8 km) is larger than expected. This information will be useful for further modeling of the deformation and to improve the coverage of the in situ measurement networks. It also shows that radar interferometry can be used for the long-term monitoring of such sites and to predict potential environmental issues. (C) 2003 Elsevier Inc. All rights reserved.

Raymond, J., F. Guilbert, A. Weill, S. A. Georganos, L. Juravsky, A. Lambert, J. Lamoureux, M. Chagnon and D. Roy (2003). "Long-term angiographic recurrences after selective endovascular treatment of aneurysms with detachable coils." *Stroke* **34**(6): 1398-1403. <Go to ISI>://000183348300012

Background and Purpose - Our aim in this study was to assess the incidence and determining factors of angiographic recurrences after endovascular treatment of aneurysms. **Methods** - A retrospective analysis of all patients with selective endosaccular coil occlusion of intracranial aneurysms prospectively collected from 1992 to 2002 was performed. There were 501 aneurysms in 466 patients (mean +/- SD age, 54.20 +/- 12.54 years; 74% female). Aneurysms were acutely ruptured (54.1%) or unruptured (45.9%). Mean +/- SD aneurysm size was 9.67 +/- 5.91 mm with a 4.31 +/- 1.97-mm neck. The most frequent sites were basilar bifurcation (27.7%) and carotid ophthalmic (18.0%) aneurysms. Recurrences were subjectively divided into minor and major (ideally necessitating re-treatment). The most significant predictors of angiographic recurrence were determined by logistic regression. These results were confirmed by chi(2), t tests, or ANOVAs followed, when appropriate, by Tukey's contrasts. **Results** - Short-term (less than or equal to 1 year) follow-up angiograms were available in 353 aneurysms (70.5%) and long-term (>1 year) follow-up angiograms, in 277 (55%), for a total of 383 (76.5%) followed up. Recurrences were found in 33.6% of treated aneurysms that were followed up and that appeared at a mean +/- SD time of 12.31 +/- 11.33 months after treatment. Major recurrences presented in 20.7% and appeared at a mean of 16.49 +/- 15.93 months. Three patients (0.8%) bled during a mean clinical follow-up period of 31.32 +/- 24.96 months. Variables determined to be significant predictors (P < 0.05) of a recurrence included aneurysm size &GE; 10 mm, treatment during the acute phase of rupture, incomplete initial occlusions, and duration of follow-up. **Conclusions** - Long-term monitoring of patients treated by endosaccular coiling is mandatory.

Rebstock, G. A. (2002). "An analysis of a zooplankton sampling-gear change in the CalCOFI long-term monitoring program, with implications for copepod population abundance trends." *Progress in Oceanography* **53**(2-4): 215-230. <Go to ISI>://000176900500006

The California Cooperative Oceanic Fisheries Investigations (CalCOFI) program has been systematically sampling zooplankton off the west coast of North America since 1949. In 1978, the 1-m diameter ring net used by the program was replaced with a bongo net, which consists of two 0.71-m diameter nets on a single frame. This study compares paired zooplankton samples taken with a ring net and a 0.71-m or 0.6-m bongo net to determine the relative performances of the two net types for catching calanoid copepods. Thirty-one species and stages were enumerated, along with the category 'total female calanoids'. Twenty-one categories of calanoid copepods were abundant enough to test for effects of changes in net type. No significant differences between the nets were found after correcting for multiple testing. Statistical power

was then estimated for a range of potential net effects equivalent to ratios of copepod densities between the nets of 1.1-3.0. The probability of detecting differences greater than a factor of 1.5-3.0 was high (greater than or equal to 80%) for total female calanoids, *Metridia pacifica*, *Pleuromamma abdominalis edentata*, *P. borealis*, *Calanus pacificus*, *Eucalanus californicus* and *Rhincalanus nasutus*. For these categories of copepods, any population changes greater than a factor of 1.5-3.0 that might be found from the CalCOFI data set can be assumed to be the result of factors other than the change in net type. (C) 2002 Elsevier Science Ltd. All rights reserved.

Reda, A. A., M. A. Arafa, A. A. Youssry, E. H. Wandan, M. Ab de Ati and H. Daebees (2003). "Epidemiologic evaluation of the immunity against hepatitis B in Alexandria, Egypt." *European Journal of Epidemiology* **18**(10): 1007-1011.<Go to ISI>://000185514600012

Background: Hepatitis B (HB) vaccine represents one of the major achievements in the 20th century. The most important epidemiologic factor affecting the chronic carrier rate is age of infection. The earlier in life an infection occurs, the higher the probability that this infection will result in chronic carriage. Methods: A seroepidemiologic study was conducted to examine the impact of HB vaccination on the carrier state among a vaccinated group of children (1000) compared to a non-vaccinated group (500) aged 6 years in Alexandria, Egypt. Results: The rate of HbsAg positivity among the vaccinated group was found to be 0.8% compared to 2.2% among the non-vaccinated group. The study showed that the efficacy of HB vaccine in preventing the carriage of HbsAg, 5 years after full course vaccination, was estimated to be around 67%. However, long-term monitoring should continue to confirm the efficacy of the vaccine in preventing chronic carrier state. On the other hand, studying the exposure to some risk factors associated with hepatitis B virus (HBV) infection revealed more or less a similar pattern of exposure among both vaccinated and unvaccinated children. Conclusion: It can be concluded that the significantly lower rate of HbsAg positivity among the vaccinated compared to the rate among the non-vaccinated is attributed to the preventive effect of the vaccine.

Reed, P. M. and B. S. Minsker (2004). "Striking the balance: Long-term groundwater monitoring design for conflicting objectives." *Journal of Water Resources Planning and Management-Asce* **130**(2): 140-149.<Go to ISI>://000220046600006

This study demonstrates the use of high-order Pareto optimization (i.e., optimizing a system for more than two objectives) on a long-term monitoring (LTM) application. The LTM application combines' quantile kriging and the nondominated sorted genetic algorithm-II (NSGA-II) to successfully balance four objectives: (1) minimizing sampling costs, (2) maximizing the accuracy of interpolated plume maps, (3) maximizing the relative accuracy of contaminant mass estimates, and (4) minimizing estimation uncertainty. Optimizing the LTM application with respect to these objectives reduced the decision space of the problem from a total of 500 million designs to a set of 1,156 designs identified on the Pareto surface. Visualization of a total of eight designs aided in understanding and balancing the objectives of the application en route to a single compromise solution. This study shows that high-order Pareto optimization holds significant potential as a tool that can be used in the balanced design of water resources systems.

Reith, C. C. and M. J. Guidry (2003). "Eco-efficiency analysis of an agricultural research complex." *Journal of Environmental Management* **68**(3): 219-229.<Go to ISI>://000184236500001

The Model Sustainable Agricultural Complex (MSAC) is a 600-acre experimental farm in south-central Louisiana, in the very southern reaches of the United States, approximately 40 km north of the Gulf of Mexico. The MSAC consists of many land uses and facilities, including a dairy, crawfish center, beef herd, sugarcane crop, and equestrian center, as well as numerous features and programs for research, education, and residence. The mission of the MSAC, which is operated by the Department of Renewable Resources at the University of Louisiana at Lafayette, has been to accommodate research and education in production agriculture, while generating revenues through the delivery of food products into the local economy. In recent years, environmental conservation has been increasingly important at the MSAC. Best management practices (BMPs) were implemented to reduce soil loss and mitigate nonpoint source pollution. Research was initiated to quantify the effectiveness of these BMPs, and workshops were conducted to explain preliminary results to local farmers. However, environmental improvements at the MSAC had until 2000 been piecemeal, which may be said as well for agriculture overall. What is needed is a comprehensive integrated approach to analyzing and improving environmental performance, as is possible when implementing an environmental management system (EMS). This manuscript describes our efforts to integrate piecemeal environmental improvements into a farm-wide program of systematic improvement. This process began with a qualitative ranking of the MSAC's inputs and outputs, followed by a quantification of certain key parameters related to the consumption of resources and provision of services at the Complex. Certain measures related to the Complex's eco-efficiency were combined into a ratio that provides a useful target for management and continuous improvement. Eco-efficiency, which is defined as 'the efficiency with which receivables are converted into deliverables', is a good way to apply the lessons of industry to the agricultural sector, for instance, by monitoring and managing resource efficiency as an aspect in an EMS such as prescribed by ISO 14000. This will require disciplined recordkeeping and managed conservation, and will promote long-term environmental improvement. (C) 2003 Elsevier Science Ltd. All rights reserved.

Rennie, J. M., G. Chorley, G. B. Boylan, R. Pressler, Y. Nguyen and R. Hooper (2004). "Non-expert use of the cerebral function monitor for neonatal seizure detection." *Archives of Disease in Childhood* **89**(1): F37-F40.<Go to ISI>://000188213500012

Background: The cerebral function monitor (CFM) is widely used to detect neonatal seizures, but there are very few studies comparing it with simultaneous electroencephalography (EEG). Objective: To determine the accuracy of non-expert use of the CFM and to assess interobserver agreement of CFM seizure detection. Patients: Babies admitted to the neonatal intensive care unit at King's College Hospital who were at high risk of seizure and had video-EEG monitoring. Methods: Video-EEG was used to detect seizures. Each baby had CFM recordings at speeds of 6, 15, and 30 cm/h during the EEG. Four neonatologists, trained in CFM seizure recognition, independently rated one hour CFM samples at three speeds from each baby. Interobserver agreement was quantified using Cohen's kappa. Results: CFM traces from 19 babies with EEG seizures and 21 babies without EEG seizures were analysed. Overall non-expert interpretation of the CFM performed poorly as a seizure detector compared with simultaneous EEG (sensitivities 38% at 6 cm/h; 54% at 15 cm/h; 55% at 30 cm/h). Although babies with seizures were more likely to be correctly classified at higher speeds ($p = 0.02$), babies without seizures were also more likely to be misclassified ($p < 0.001$). Agreement between observers was

not good at any speed (κ ; values from 0.01 to 0.39). The observers usually detected generalised seizures but often missed seizures that were focal, low amplitude, or lasted less than one minute. Conclusion: Approximately half of all neonatal seizures may be missed using CFM alone. Neonatal seizures need to be diagnosed, characterised, and quantified first using EEG. The CFM may then be useful for long term monitoring.

Ringel, M. D. and P. W. Ladenson (2004). "Controversies in the follow-up and management of well- differentiated thyroid cancer." Endocrine-Related Cancer 11(1): 97-116.<Go to ISI>://000220540000007

Thyroid cancer is a common malignancy with an apparent increasing incidence and a wide spectrum of clinical behavior and therapeutic responsiveness. Recent advances in diagnosis, primary treatment, and long-term monitoring have led to enhanced detection of primary and recurrent disease and improvements in therapy. Controversy still surrounds several issues: the most accurate predictive staging system and histological subclassification scheme, optimal preoperative assessment and surgical extent, appropriate use of radioiodine for remnant ablation, goal for thyrotropin-suppressive thyroid hormone therapy, best practices in immediate postoperative and long-term monitoring, and approach to the patient with thyroglobulin evidence of residual disease. In this paper, recent data related to these controversial issues are critically reviewed.

Rizzo, V. and M. Leggeri (2004). "Slope instability and sagging reactivation at Maratea (Potenza, Basilicata, Italy)." Engineering Geology 71(3-4): 181-198.<Go to ISI>://000188461700001

The present work shows results collected, through a long-term monitoring, on slope movements in the Maratea Valley (Potenza, Italy). The investigated area shows large-scale gravitational phenomena and sagging type morphology that have been well- described in previous works. Electronic Distance Meter (EDM) measurements were first taken in 1983 and from these it would appear that since about 1991 there has been an acceleration in the movement occurring in the upper part of the valley, where sagging is located and which was previously motionless. Seismic and rainfall series for the last 20 years have been examined. The data collected show that this sagging destabilisation could not be related to rainfall and recent seismic activity; the latter reactivating later, in 1998. Global Positioning System (GPS) data on a network including benchmarks located outside of the landslide area, and comparison with EDM data indicate that movement affected the surrounding mountain slopes, widening the valley and destabilising the sagging: thus suggesting a relationship between the sagging and tectonic activity. (C) 2003 Elsevier B.V. All rights reserved.

Roberts, D. A., M. Keller and J. V. Soares (2003). "Studies of land-cover, land-use, and biophysical properties of vegetation in the Large Scale Biosphere Atmosphere experiment in Amazonia." Remote Sensing of Environment 87(4): 377-388.<Go to ISI>://000186827400001

We summarize early research on land-cover, land-use, and biophysical properties of vegetation from the Large Scale Biosphere Atmosphere (LBA) experiment in Amazonia. LBA is an international research program developed to evaluate regional function and to determine how land-use and climate modify biological, chemical and physical processes there. Remote sensing has played a fundamental role in LBA in research planning, land-cover mapping and in long-term monitoring of changes in land-cover and land-use at multiple scales. This special issue includes 12 papers that cover a range in spatial scales from regional mapping to local scales that cover only a portion of a Landsat scene. Several themes dominate, including land-cover mapping with an emphasis on wetlands and second- growth forest, evaluation of pasture sustainability and forest degradation and the impact of land-cover change on stream chemistry. New techniques introduced include automated Monte Carlo unmixing (AutoMCU) and several new approaches for mapping land-cover. A diversity of sensors are utilized, including ETM+, IKONOS, SPOT-4, Airborne P-band synthetic aperture radar (SAR), and L-band SAR. Census data are fused with an existing land-cover map to generate spatially explicit estimates of land-use from historical data. Several papers include important, new field measures of species composition, forest structure and biomass in mature forest and secondary succession. (C) 2003 Elsevier Inc. All rights reserved.

Rodriguez-Robles, J. A. (2003). "Home ranges of gopher snakes (*Pituophis catenifer*, Colubridae) in central California." Copeia(2): 391-396.<Go to ISI>://000183817700019

Knowledge of the home range of an animal can provide insights for studies of behavioral interactions among individuals, and long-term monitoring of particular animals is necessary to determine whether they exhibit seasonal variation in space-use patterns. I radio-tracked four adult male *Pituophis catenifer* (gopher snake) in central California for 14 consecutive months to investigate spatial and seasonal movement patterns. Using the fixed kernel density estimator to produce a probability contour, the 95% home ranges of *P. catenifer* ranged from 0.89- 1.78 ha, whereas their core areas (50% polygons), the most heavily used areas of their home ranges, ranged from 0.1-0.29 ha. Movements of male *P. catenifer* were similar in spring and summer and decreased in autumn and winter. The telemetered snakes were close to marshes and Eucalyptus woodlands but were routinely found in grassland areas, perhaps because this habitat type may provide abundant food resources and partial protection from predators. Despite their proximity, the estimated home ranges of males 2, 3, and 4 did not overlap. These findings, and those of a previous investigation of activity patterns of *P. catenifer* in eastern Nebraska, suggest that syntopic gopher snakes occupy exclusive home ranges during at least part of their active season.

Roots, O. and V. Zitko (2004). "Chlorinated dibenzo-p-dioxins and dibenzofurans in the Baltic herring and sprat of Estonian coastal waters." Environmental Science and Pollution Research 11(3): 186-193.<Go to ISI>://000221826800009

Background, Aims and Scope. The concentration of chlorinated dibenzo-p-dioxins and dibenzofurans in many fish from the Baltic requires monitoring, since it approaches or exceeds the European Union threshold limit value of 4 pg TEQ/g wet weight of fish for human consumption. The concentrations, expressed in TEQs, are important for toxicology and regulations, but hide the concentrations of the individual congeners, which are important for other environmental sciences, source allocation, and for the detection of measurement errors. This report evaluates the results of a survey reported earlier only in the terms of the TEQ concentrations. Methods. Principal Component Analysis (PCA) was used to reduce the dimensions of the data (17 = 7 chlorinated dibenzo-p-dioxin and 10 chlorinated dibenzofuran congeners) to three principal components. This facilitated the interpretation of the congener profiles. Slopes of the congener concentrations as a function of age of the fish were estimated by least squares regression. The results were compared with a large set of data

for lake trout from Lake Ontario. Results and Discussion. The congener profiles of Baltic herring are less scattered than those of sprat. The profiles of herring from the central Baltic differ from those of herring from the Gulf of Riga and both appear to be affected relatively minimally by the age of the fish. The congener profiles of herring from the western Gulf of Finland are similar to those from the central Baltic, those from middle Gulf of Finland are similar to those from the Gulf of Riga. Both seem to be more affected by age of the fish than the profiles of the first two groups. The concentrations of several pentachloro- and hexachloro-dibenzo-p-dioxins and dibenzofurans increase with the age of the fish. Conclusion. PCA is a good technique for the evaluation of the congener profiles. The resulting loading and score plots provide a good graphic summary of the multidimensional data. Additional analyses are needed to confirm the observed profile patterns. A comparison with the results of a long-term monitoring from another area shows that the age of the fish is a more important factor than the year of capture. Recommendation and Outlook. The surveys should continue for a number of years and the results should be presented and evaluated both in terms of the TEQs as well as in terms of weight concentrations. Since the concentrations do not appear to change very much from year to year, it would be better to carry out surveys only every 3-4 years and, instead, stratify the sampling according to age and gender of the fish, and to analyze replicate extracts by replicate measurements. The inclusion of unmarked replicate samples would be a good quality assurance measure. It would be desirable to analyze additional parts of the food chain in order to understand the fate of the compounds in the ecosystem.

Rothbaum, H. P., R. L. Goguel, A. E. Johnston and G. E. G. Mattingly (1986). "Cadmium Accumulation in Soils from Long-Continued Applications of Superphosphate." Journal of Soil Science **37**(1): 99-107.<Go to ISI>://A1986A390700011

Rothbaum, H. P., D. A. McGaveston, T. Wall, A. E. Johnston and G. E. G. Mattingly (1979). "Uranium Accumulation in Soils from Long-Continued Applications of Super-Phosphate." Journal of Soil Science **30**(1): 147-153.<Go to ISI>://A1979GY45700013

Sailer, M. and B. Kallenbach-Herbert (2003). "Long-term aspects of fuel element interim storage." Atw-International Journal for Nuclear Power **48**(8-9): 537-+.<Go to ISI>://000188435700005

Interim storage in casks of spent fuel elements over prolonged periods of time requires safety-related components to be available and functional throughout the entire period of operation or else to be beefed up to that condition by the appropriate backfitting measures. Even on an international scale, there is little practical experience over long periods of operation, and what is available is limited to fuel elements with comparatively low burnups. To ensure that there are no safety-related deviations from the specified status, a long-term monitoring program should be set up for all fuel element interim stores, which should include regular monitoring measures and a reporting phase every ten years covering all findings and results. As inspections of the inside of casks, of the gas atmosphere, and of the behavior of cladding tubes entail higher expenses, these inspections, supplemented by a monitoring program to determine the development of the leakage rate, should be run in an accompanying program incorporating all plants, the results of which would then be included in plant-specific evaluations. As the first German interim stores will complete their first decade of operation in a foreseeable period of time, measures should be taken there at short notice even if it is not to be expected at the present point in time that safety-related long-term effects will be discovered after the first decade of operation.

Salvidio, S., M. Mori, A. Lattes, L. Galli and A. Arillo (2002). "The freshwater crayfish *Austropotamobius pallipes* (Lereboullet, 1858) in Liguria, NW Italy: Implications for management at the regional level." Bulletin Francais De La Peche Et De La Pisciculture (367): 663-670.<Go to ISI>://000180910600005

Since 1990, field surveys have been undertaken in Liguria to assess the distribution and status of *Austropotamobius pallipes* populations. In this region, crayfish stocks were found in three bioclimatic regions: Alpine, Mediterranean and Continental. Although epidemic diseases and invasive alien crayfish have been recorded, modifications of freshwater habitats have to be considered as the most significant threats to native crayfish stocks. Regarding management, the Regional Administration of Liguria proposed 18 Sites of Community Importance (SCI) containing crayfish populations, in the framework of the Habitats Directive (92/43/EEC). Since public managers need to take informed decisions in land-use management and conservation a numeric biodiversity map, composed by a georeferenced database connected to a geographic information system (GIS), has been implemented. This regional system is composed by 22 different layers containing all the available information about the location of species and habitats of conservation interest. This system is now routinely used by regional administrators in environmental impact assessment. Finally, emphasis is placed on the need of promoting research programmes on the long-term monitoring of crayfish populations.

Salwicka, K. and S. Rakusa-Suszczewski (2002). "Long-term monitoring of Antarctic pinnipeds in Admiralty Bay (South Shetlands, Antarctica)." Acta Theriologica **47**(4): 443-457.<Go to ISI>://000180049800007

Year-round monitoring of five Antarctic pinnipeds was conducted in Admiralty Bay from 1988 up to 2000. Two breeding species: southern elephant seals *Mirounga leonina* (Linnaeus, 1758) and Weddell seals *Leptonychotes weddellii* (Lesson, 1826), were present throughout the year. Three other species: crabeater seals *Lobodon carcinophagus* (Hobson and Jacquinot, 1842), leopard seals *Hydrurga leptonyx* (Blainville, 1820), and Antarctic fur seals *Arctocephalus gazella* (Peters, 1875) visited the area only for short periods. During this study, the abundance of elephant seals was stable, whereas those of Weddell and crabeater seals declined. Leopard seals numbers fluctuated irregularly. We detected a possible immigration from South Georgia: of a stable magnitude for elephant seals, and of variable magnitude, depending on food accessibility, for Antarctic fur seals. We found a strong recurrence of the spatial distributions of elephant, Weddell, and Antarctic fur seals in the 13 oases on the shore of Admiralty Bay. Annual distribution patterns were characteristic for each species. The innermost beaches were used predominantly by the animals during their annual fasts: the breeding and the moulting seasons.

Sanchez, J. E., T. C. Willson, K. Kizilkaya, E. Parker and R. R. Harwood (2001). "Enhancing the mineralizable nitrogen pool through substrate diversity in long term cropping systems." Soil Science Society of America Journal **65**(5): 1442-1447.<Go to ISI>://000172918500014

The development of sustainable N management systems requires a better understanding of the contribution of on-farm resources to the active N pool size and its mineralization. This study explores the effect of substrate diversity on improving

N supply through mineralization. A "diverse system", consisting of a corn (*Zea mays* L.)-cornsoybean (*Glycine max* L.)-wheat (*Triticum aestivum* L.) rotation with cover crops and fertilized with composted manure was compared with a corn monoculture with conventional fertilizers. Nitrogen mineralization was measured in situ and in laboratory incubations as was the ability of each soil to mineralize added compost and red clover (*Trifolium pratense*) residue in the 6th and 7th yr of rotation. Net mineralized N in the diverse system was 90 and 40% higher than that in the monoculture at 70 and 150 d of laboratory incubations respectively. Comparable response was found in situ where a 70% higher net mineralization was observed in the diverse system at 70 d. The 70 and 150-d mineralizable N pools increased over time, but the ability of soil organisms to break down additional substrate did not change as a result of system diversity. At 150 d of laboratory incubation, a synergistic effect was observed when 5 Mg ha⁻¹ of compost plus 5 Mg ha⁻¹ of clover was added to either soil. The combination of the two organic materials mineralized more N than the sum of their individual mineralization results. A more diverse cropping system may increase the soil's capacity to supply N to a growing crop while maintaining desirable levels of soil organic matter. This is essential for the overall long-term productivity and sustainability of agricultural systems.

Sandlund, O. T. and K. Aagaard (2004). "Long term monitoring and research in an alpine-boreal watershed: Atndalen in perspective." *Hydrobiologia* **521**(1-3): 203-208.<Go to ISI>://000221177900016

Sandstrom, M., E. Lyskov, R. Hornsten, K. H. Mild, U. Wiklund, P. Rask, V. Klucharev, B. Stenberg and P. Bjerle (2003). "Holter ECG monitoring in patients with perceived electrical hypersensitivity." *International Journal of Psychophysiology* **49**(3): 227-235.<Go to ISI>://000185820800005

Earlier studies have indicated that patients claiming to be sensitive to electromagnetic fields, so-called electrical hypersensitivity (EHS), have a dysbalance of the autonomic nervous system (ANS) regulation. This paper focuses on a possible dysbalance in the ANS among EHS patients by the use of long-term monitoring of electrocardiogram (ECG) in both a patient and a matched control group. At the same time, the environmental power frequency magnetic field was recorded for both groups in order to see if there was any difference in exposure between the groups. ECG, heart rate (HR) and heart rate variability (HRV) as well as the magnetic field exposure were monitored for 24 h. Fourteen patients with perceived EHS symptoms were selected from the University Hospital, Umea, Sweden. Symptoms indicating autonomic nervous dysregulation were not part of the inclusion criteria of the patient group. Age and sex matched healthy subjects were used as controls. No differences were found between the groups regarding magnetic field exposure or the mean HR for 24 h. The HRV analyses showed that the high-frequency (HF) component did not have the expected increase with sleep onset and during nighttime in the EHS group. When separating the sleeping and awake time even less differences between the two conditions in the EHS patients, both for the low-frequency and HF components in the HRV spectrum, were seen. EHS patients had a disturbed pattern of circadian rhythms of HRV and showed a relatively 'flat' representation of hourly-recorded spectral power of the HF component of HRV (C) 2003 Elsevier B.V. All rights reserved.

Sarwar, A., W. G. M. Bastiaanssen and R. A. Feddes (2001). "Irrigation water distribution and long-term effects on crop and environment." *Agricultural Water Management* **50**(2): 125-140.<Go to ISI>://000170367000004

The response of three water delivery schedules, representing various levels of flexibility, on crop production, water saving, soil salinization, drainage volumes and watertable behavior was examined. A physical-based transient soil water and solute transfer model, Soil-Water-Atmosphere-Plant (SWAP), was used as a tool. The evaluations were made for unrestricted and restricted water supply situations considering three different watertable conditions prevailing in the fourth drainage project (FDP) of the Punjab, Pakistan. From the simulation results it is apparent that on average the effect of irrigation schedule flexibility on crop yields is not very significant. However, compared to a fixed schedule provided unrestricted canal water supplies are available, the Productivity of irrigation water supply (Y-act/I-IT), is up to 30% higher for the on-demand schedule. The on-demand schedule capable of complying with the temporal variations in climate is also more effective in water saving, reducing drainage volumes and controlling rising water-tables if farmers follow guidelines and do not over-irrigate. In the present water deficient environment of the Indus basin, the benefits of the on-demand schedule and a fixed schedule are comparable. In the absence of sufficient canal water supplies, infrastructure and a well-designed and effective monitoring and communication system, moving towards the on-demand system will be unproductive. For the longterm sustainability of the irrigation system, improvements in the performance of the present water allocations and on-farm water management practices seems to be more necessary. (C) 2001 Elsevier Science B.V. All rights reserved.

Scharer, L. O., V. Hartweg, M. Hoern, Y. Graesslin, N. Strobl, S. Frey, C. Biedermann, S. Walser and J. Walden (2003). "Electronic diary for bipolar patients." *Neuroradiology* **46**: 10-12.<Go to ISI>://000181391200003

Long-term monitoring methods providing an overview of the course of bipolar disorder of individual patients are a clinical necessity at least for patients who require a combination therapy with drugs that have only proven their efficacy for monotherapy. The Life Chart Method (LCM) of the NIMH is an adequate method for this purpose. Unfortunately, due to data entry and management requirements, it is too expensive for everyday clinical use. The 'electronic diary for patients with bipolar disorder' is meant to provide a method to minimize the effort for detailed long-term monitoring of patients with bipolar affective disorder and thus make it available for the everyday clinical use for every bipolar patient. Copyright (C) 2003 S. Karger AG, Basel.

Schmidt, O. (2001). "Time-limited soil sorting for long-term monitoring of earthworm populations." *Pedobiologia* **45**(1): 69-83.<Go to ISI>://000167065800007

Hand sorting of soil blocks is a reliable but very labour intensive and tedious method for estimating earthworm population sizes. A standardised, time-limited, intensive sorting procedure was adopted for a long-term earthworm field population study and the error in population estimates resulting from the use of this procedure was quantified during monthly sampling over one cropping cycle of conventional wheat and direct-drilling wheat-clover fields. Compared to full soil sorting without time restriction, time-limited sorting achieved mean relative recoveries of 81-87 % of earthworm numbers and 94-97 % of earthworm biomass, but required only 36 % of the actual sorting time needed for full sorting. The earthworms which were missed during time-limited sorting were mainly unpigmented juveniles, accounting for 90 % of the numbers

and 70 % of the biomass, and their mean individual biomass was 31-38 mg. It is concluded that validated time-limited soil sorting is a useful, time-saving and also ergonomically advantageous approach for long-term studies of earthworm population dynamics.

Schratzberger, M., P. Whomersley, R. Kilbride and H. L. Rees (2004). "Structure and taxonomic composition of subtidal nematode and macrofauna assemblages at four stations around the UK coast." Journal of the Marine Biological Association of the United Kingdom **84**(2): 315-322.<Go to ISI>://000221139600003

The diversity and structure of meiobenthic nematodes and macrobenthic infauna were studied at four widely spaced subtidal sites around the UK coast in relation to a number of measured environmental variables. The stations were situated on soft sediments at water depths of 53 to 95 m and are intended as long-term monitoring locations as part of the UK National Marine Monitoring Programme. Similar benthic assemblages were encountered in comparable environmental conditions. The distribution of nematode and macrofauna species was mainly governed by the geographical location of the habitat and the granulometric composition of the substrate. There was no evidence of any adverse effect on the measures of benthic assemblage structure arising from trace metal concentrations in the sediment, indicating the relatively unpolluted nature of the offshore locations under investigation. Nematode and macrofauna assemblages exhibited stable patterns over time periods of three years.

Scott, W. A. and R. Anderson (2003). "Temporal and spatial variation in carabid assemblages from the United Kingdom Environmental Change Network." Biological Conservation **110**(2): 197-210.<Go to ISI>://000180818400004

This paper presents analyses of the data from the first 7 years of the UK Environmental Change Network (ECN) carabid monitoring programme. The 10 ECN terrestrial sites for which results are available represent a wide range of habitats, from lowland arable farmland to upland moorland, and correspondence analysis reveals the strong association between habitat and species composition. At all sites carabid assemblages are dominated by a small proportion of the species found at the site. There are strong year-to-year fluctuations in the proportions of individual species and a large percentage of species are observed only sporadically. This has major implications for the conservation and monitoring of carabids. Simple summary statistics, such as species richness or diversity do not adequately reflect variation in species composition and are unlikely to respond quickly to environmental change. The considerable annual variation makes the detection of relationships with sources of environmental change a difficult task, particularly for the rarer species of primary conservation interest. Analysis should therefore include measures based on the dominant species to provide an early warning system for environmental change. (C) 2002 Elsevier Science Ltd. All rights reserved.

Sear, D. A. and M. D. Newson (2003). "Environmental change in river channels: a neglected element. Towards geomorphological typologies, standards and monitoring." Science of the Total Environment **310**(1-3): 17-23.<Go to ISI>://000183883300003

Rivers integrate the impacts of change in atmospheric and terrestrial systems; they then deliver these to the coast. En route geomorphological processes create dynamic and diverse habitats, both in-stream and in riparian/floodplain ecotones. The dynamics of channel change conflict with human resource development, the outcome is that many river and riparian environments have been significantly modified, complicating the interpretation of change. Collection of geomorphological data on both form and process has to date been overwhelmingly an academic pursuit; standard measurement networks and long-term monitoring have, as a result been largely absent-as in the Environmental Change Network (ECN), despite the emerging requirements of legislation such as the EU Water Framework Directive. In this paper, we utilise a unique set of repeat channel surveys and long-term bed-load sediment yields to provide guidance on both definitions of change and those variables and survey techniques which might form the basis, in future, of improved national-scale monitoring. The Environment Agency's River Habitat Surveys suggest the basis for channel typologies that could structure a sampling framework and rationalise the variables to be monitored. We also point to the value of more detailed geomorphological procedures in use at the catchment/project scale-Catchment Baseline Surveys and Fluvial Audits-as a standardised basis for monitoring the detail of change in the fluvial sediment system. A perfect opportunity to lay foundations for such monitoring activity has been provided in England and Wales by the winter floods of 2000/2001. (C) 2002 Elsevier Science B.V. All rights reserved.

Seguin, B., J. P. Lagouarde and M. Savane (1991). "The Assessment of Regional Crop Water Conditions from Meteorological Satellite Thermal Infrared Data." Remote Sensing of Environment **35**(2-3): 141-148.<Go to ISI>://A1991FR68300006

Meteorological satellites (mainly NOAA AVHRR) have been extensively used these last years to monitor vegetation and crop conditions on a regional scale, using vegetation index NDVI data. Recent work with Nimbus-7 passive microwave measurements has also shown the complementary potential of that spectral domain. On the other hand, the thermal infrared channels, in spite of their well-known ability to detect water stress (as established by ground studies at a local scale), are less studied for the same purpose of long-term monitoring. This paper intends to demonstrate their capabilities in assessing crop water conditions on a regional scale and estimating the actual evapotranspiration (ET) to be used in agrometeorological models. A brief analysis of past studies justifies the use of the cumulative $SIGMA-(T(s) - T(a))$ (difference between the midafternoon surface temperature by satellite and the maximum air temperature obtained from the meteorological ground network), named stress-degree-day by Jackson et al. (1977) which may be related to ET by a simplified linear relationship. This criterion, already tested in Sahelian regions (Seguin et al., 1989), is applied to France on a large scale, corresponding to the entire country, using 5-day syntheses from Meteosat, calibrated by NOAA AVHRR on selected dates, for 3 years (1985-1987). Values of $SIGMA-(T(s) - T(a))$ may be considered as climatological data. They reveal both spatial differences in regional climates and the main features of each year. The use of the linear relationship, derived from ET values computed from a coupled energy budget-water balance model, allows one to estimate and map regional evaporation on a monthly to 6-month time basis. The variations obtained along a latitudinal transect display the relations between ET and potential evapotranspiration (PET), also leading to an indirect estimation of PET from remote sensing data. $SIGMA-(T(s) - T(a)) / R(n)$ is proposed as an index of regional water stress, which may be derived from satellite data and appears as complementary to the integrated NDVI, with the advantage of a more physically established relationship with ET.

Sehlen, S., M. Lenk, P. Herschbach, U. Aydemir, M. Dellian, B. Schymura, H. Hollenhorst and E. Duhmke (2003). "Depressive symptoms during and after radiotherapy for head and neck cancer." Head and Neck-Journal for the Sciences and Specialties of the Head and Neck **25**(12): 1004-1018.<Go to ISI>://000186886400004

Background. Patients with head and neck cancer are extraordinarily susceptible to depressive traits. Thus, a general screening of these patients at their first admission to the hospital is desirable. Methods. From 1997-2001, 133 patients with head and neck tumors filled in the Self-Rating-Depression- Scale (SDS) at the beginning and end of radiotherapy (ti1/ti2), 6 weeks, and 6 months after radiotherapy (ti3/ti4). Results. The SIDS index increased significantly from 46.44 (ti1) to 48.91 (ti2) ($p = .025$) and then remained stable. The subdomain "somatic-eating-related symptoms" at ti1 was significantly lower than ti2 ($p < .001$). In contrast to inpatients, outpatients and those with conventional instead of hyperfractionated-accelerated radiotherapy were less impaired by eating-related symptoms. Patients with higher education showed a lower SIDS index and cognitive scale. Marital status, tumor stage, histologic grading, and substance abuse had no influence. Conclusions. Patients with a higher risk of depression should receive long-term monitoring during and after the end of radiotherapy, and Prompt intervention strategies should be applied. (C) 2003 Wiley Periodicals, Inc.

Sharma, K. D., P. Kumar, L. P. Gough and J. R. Sanfilippo (2004). "Rehabilitation of a lignite mine-disturbed area in the Indian Desert." Land Degradation & Development **15**(2): 163-176.<Go to ISI>://000220799400007

Extensive lignite mining in the Indian (Thar) Desert commenced within the past decade. Accompanying extraction of this valuable resource there have been visible, important environmental impacts. The resultant land degradation has prompted concern from both public and regulatory bodies. This research assesses the success of rehabilitation plans implemented to revegetate a lignite mine-disturbed area, near the village of Giral in western Rajasthan State. Rehabilitation success was achieved within the environmental constraints of this northwest Indian hot-desert ecosystem using a combination of: (1) backfilling (abandoned pits) with minespoil and of covering the backfilled-surfaces with fresh topsoil to a thickness of about 0-30 m; (2) use of micro-catchment rainwater harvesting (MCWH) technique; (3) soil profile modification approaches; (4) plant establishment methodologies; and (5) the selection of appropriate germplasm material (trees, shrubs and grasses). Preliminary results indicate that the resulting vegetative cover will be capable of self-perpetuation under natural conditions while at the same time meeting the land-use requirements of the local people. The minespoil is alkaline in nature and has high electrical conductance. The average content of organic carbon, N, P and K is lower than in the regional topsoil. However, the concentration of Ca, Mg, Na and total S in the minespoil is much higher than in the topsoil. Further, the spoil material has no biological activity. Enhanced plant growth was achieved in MCWH plots, compared to control plots, where minespoil moisture storage was improved by 18-43 per cent. The rehabilitation protocol used at the site appears to have been successful because, in addition to the planted species, desirable native invasive species have become established. This study developed methods for the rehabilitation of lignite mine-disturbed areas and has also resulted in an understanding of rehabilitation processes in and regions with an emphasis on the long-term monitoring of rehabilitation success. Copyright (C) 2004 John Wiley Sons, Ltd.

Shinohara, N., K. Kumagai, N. Yamamoto, Y. Yanagisawa, M. Fujii and A. Yamasaki (2004). "Field validation of an active sampling cartridge as a passive sampler for long-term carbonyl monitoring." Journal of the Air & Waste Management Association **54**(4): 419-424.<Go to ISI>://000220643300006

A carbonyl sampler originally designed for the active sampling method (Sep-Pak XPoSure) was used for long-term passive sampling, and its applicability as a passive sampler was examined through field experiments. The uptake rates of passive sampling were determined experimentally from collocated passive and active samplings for various sampling periods. The obtained uptake rates of formaldehyde, acetaldehyde, and acetone were 1.48, 1.23, and 1.08 mL/min, respectively. These uptake rates were consistent for a wide range of the sampling term (12 hr-2 weeks). Uptake rates of each carbonyl were proportional to the diffusion coefficients of each. Therefore, the ratios of diffusion coefficients were used to calculate the uptake rates of carbonyls for which the rates were not determined experimentally. Lower limits of determination were 2.16-17.5 $\mu\text{g}/\text{m}^3$ for 2-week sampling. It was confirmed that 2-week monitoring of carbonyl concentrations up to 118229 $\mu\text{g}/\text{m}^3$ was possible. Relative standard deviations of the passive method generated from the repeatability test were 2-12.3% error for five samplings, and the recovery efficiencies were larger than 90%. Thus, the passive sampler was found to be highly suitable for long-term monitoring of carbonyl compounds.

Shirokov, I. A. and K. M. Anokhina (2003). "Possibilities of short-range prediction of strong earthquakes from data of high-precision tilt measurements." Izvestiya-Physics of the Solid Earth **39**(10): 785-793.<Go to ISI>://000186192300001

An attempt to predict near strong earthquakes from tilt variations is made on the basis of long-term monitoring, observations in the seismically active Alma-Ata region (the North Tien Shan). Retrospective analysis of data of continuous tilt measurements at the Talgar station revealed anomalous tilts preceding near strong earthquakes and characterized by a set of common kinematic features, which can be considered, under certain conditions, as precursors. Seventeen earthquakes with M greater than or equal to 4 and epicentral distances Delta less than or equal to 400 km occurred during the time of observations. Anomalous tilts were recorded prior to 14 of the 17 earthquakes. In the remaining three cases, no anomalous tilts were recorded. The inferred precursors had a baylike shape and a lifetime of 10-30 days. The elastic anisotropy and block structure of the North Tien Shan are shown to affect the magnitude and azimuth of recorded anomalous tilts, which significantly hampers the prediction of the magnitude and coordinates of a forthcoming earthquake.

Shrobe, H. (2002). "Computational vulnerability analysis for information survivability." Ai Magazine **23**(4): 81-91.<Go to ISI>://000180288700007

The infrastructure of modern society is controlled by software systems. These systems are vulnerable to attacks; several such attacks, launched by "recreation hackers," have already led to severe disruption. However, a concerted and planned attack whose goal is to reap harm could lead to catastrophic results (for example, by disabling the computers that control the electrical power grid for, a sustained period of time). The survivability of such information systems in the face of attacks is therefore an area of extreme importance to society. This article is set in the context of self-adaptive survivable systems: software that judges the trustworthiness of the computational resources in its environment and that chooses how to achieve its goals in light of this trust model. Each self-adaptive survivable system detects and diagnoses compromises of its resources, taking whatever actions are necessary to recover from attack. In addition, a long-term monitoring system

collects evidence from intrusion detectors, firewalls and all the self-adaptive components, building a composite trust model used by each component. Self-adaptive survivable systems contain models of their intended behavior; models of the required computational resources; models of the ways in which these resources can be compromised; and finally, models of the ways in which a system can be attacked and how such attacks can lead to compromises of the computational resources. In this article, I focus on computational vulnerability analysis: a system that, given a description of a computational environment, deduces all the attacks that are possible. In particular, its goal is to develop multistage attack models in which the compromise of one resource is used to facilitate the compromise of other, more valuable resources. Although the ultimate aim is to use these models online as part of a self-adaptive system, there are other offline uses as well that we are deploying first to help system administrators assess the vulnerabilities of their computing environment.

Siegrist, S., D. Schaub, L. Pfiffner and P. Mader (1998). "Does organic agriculture reduce soil erodibility? The results of a long-term field study on loess in Switzerland." *Agriculture Ecosystems & Environment* **69**(3): 253-264. <Go to ISI>://000074584600007
In a long-term field trial in northwestern Switzerland, the effects of organic and conventional land-use management on earthworm populations and on soil erodibility were investigated. A silt loam soil which had developed in deep deposits of alluvial loess characterised the study site. Three methods were applied to analyse soil erodibility, at three different periods between autumn 1992 and 1993: aggregate stability (measured in the laboratory by a high energy rainfall simulation and by percolation) and soil particle detachment (measured in the field by splash erosion). Earthworm biomass and density, as well as the population diversity, were significantly greater on the organic plots than on the conventional plots. Likewise, the aggregate stability of the organic plots, when determined by means of percolation, was significantly better. Therefore, erosion susceptibility is greater on plots farmed conventionally. On the other hand, splash erosion monitoring and simulated rainfall experiments only partially highlight differences in erodibility between the two main land-management methods. Future comparisons between the farming systems should also include farmer managed fields with greater differentiation in crop rotations and cultural practices like tillage, fertilisation and pesticide use. (C) 1998 Elsevier Science B.V. All rights reserved.

Silver, S. C., L. E. T. Ostro, L. K. Marsh, L. Maffei, A. J. Noss, M. J. Kelly, R. B. Wallace, H. Gomez and G. Ayala (2004). "The use of camera traps for estimating jaguar *Panthera onca* abundance and density using capture/recapture analysis." *Oryx* **38**(2): 148-154. <Go to ISI>://000221639400015

Across their range jaguars *Panthera onca* are important conservation icons for several reasons: their important role in ecosystems as top carnivores, their cultural and economic value, and their potential conflicts with livestock. However, jaguars have historically been difficult to monitor. This paper outlines the first application of a systematic camera trapping methodology for abundance estimation of jaguars. The methodology was initially developed to estimate tiger abundance in India. We used a grid of camera traps deployed for 2 months, identified individual animals from their pelage patterns, and estimated population abundance using capture-recapture statistical models. We applied this methodology in a total of five study sites in the Mayan rainforest of Belize, the Chaco dry forest of Bolivia, and the Amazonian rainforest of Bolivia. Densities were 2.4-8.8 adult individuals per 100 km², based on 7-11 observed animals, 16-37 combined 'captures' and 'recaptures', 486-2,280 trap nights, and sample areas of 107- 458 km². The sampling technique will be used to continue long-term monitoring of jaguar populations at the same sites, to compare with further sites, and to develop population models. This method is currently the only systematic population survey technique for jaguars, and has the potential to be applied to other species with individually recognizable markings.

Sims, J. T., E. Igo and Y. Skeans (1991). "Comparison of Routine Soil Tests and Epa Method 3050 as Extractants for Heavy-Metals in Delaware Soils." *Communications in Soil Science and Plant Analysis* **22**(11-12): 1031-1045. <Go to ISI>://A1991GF15700001

Agricultural use of sewage sludges can be limited by heavy metal accumulations in soils and crops. Information on background levels of total heavy metals in soils and changes in soil metal content due to sludge application are, therefore, critical aspects of long-term sludge monitoring programs. As soil testing laboratories routinely, and rapidly, determine, in a wide variety of agricultural soils, the levels of some heavy metals and soil properties related to plant availability of these metals (e.g. Cu, Fe, Mn, Zn, pH, organic matter, texture), these labs could participate actively in the development and monitoring of environmentally sound sludge application programs. Consequently, the objective of this study was to compare three soil tests (Mehlich 1, Mehlich 3, and DTPA) and an USEPA approved method for measuring heavy metals in soils (EPA Method 3050), as extractants for Cd, Cu, Ni, Pb and Zn in representative agricultural soils of Delaware and in soils from five sites involved in a state-monitored sludge application program. Soil tests extracted less than 30% of total (EPA 3050) metals from most soils, with average percentages of total metal extracted (across all soils and metals) of 15%, 32%, and 11% for the Mehlich 1, Mehlich 3, and DTPA, respectively. Statistically significant correlations between total and soil test extractable metal content were obtained with all extractants for Cu, Pb, and Zn, but not Cd and Ni. The Mehlich 1 soil test was best correlated with total Cu and Zn ($r = 0.78^{***}$, 0.60^{***} , respectively), while the chelate-based extractants (DTPA and Mehlich 3) were better correlated with total Pb ($r = 0.85^{***}$, 0.63^{***}). Multiple regression equations for the prediction of total Cu, Ni, Pb, and Zn, from soil test extractable metal in combination with easily measured soil properties (pH, organic matter by loss on ignition, soil volume weight) had R² values ranging from 0.41^{***} to 0.85^{***}, suggesting that it may be possible to monitor, with reasonable success, heavy metal accumulations in soils using the results of a routine soil test.

Sinclair, R. (2004). "Persistence of dead trees and fallen timber in the arid zone: 76 years of data from the TGB Osborn Vegetation Reserve, Koonamore, South Australia." *Rangeland Journal* **26**(1): 111-122. <Go to ISI>://000222148400008
Very little information is available about how long dead trees remain standing, or fallen logs persist, in the Australian and zone. Data on dead timber longevity were extracted from records of both permanent quadrats and photopoints on the T.G.B. Osborn Vegetation Reserve on Koonamore Station, South Australia. Two species were examined, *Acacia aneura* (mulga) and *Myoporum platycarpum* (false sandalwood, sugarwood). Some individuals of mulga are capable of standing dead for over 75 years, while dead *M. platycarpum* may stand for over 60 years. Dead *Myoporum* trees remained standing for an average of 31.2 +/- 5.7 years, fallen trunks persisted for 38.4 +/- 3.7 years. Standing dead *A. aneura* persisted on

average for 40.0 +/- 3.7 years, fallen trunks for 22.4 +/- 6.3 years. These figures are almost certainly underestimates. The reasons why are discussed and some comparisons made with temperate forests and tropical mangroves.

Slater, L. and A. Binley (2003). "Evaluation of permeable reactive barrier (PRB) integrity using electrical imaging methods." Geophysics **68**(3): 911-921. <Go to ISI>://000220836200013

The permeable reactive barrier (PRB) is a promising in-situ technology for treatment of hydrocarbon-contaminated groundwater. A PRB is typically composed of granular iron which degrades chlorinated organics into potentially nontoxic dehalogenated organic compounds and inorganic chloride. Geophysical methods may assist assessment of in-situ barrier integrity and evaluation of long-term barrier performance. The highly conductive granular iron makes the PRB an excellent target for conductivity imaging methods. In addition, electrochemical storage of charge at the iron-solution interface generates an impedance that decreases with frequency. The PRB is thus a potential induced polarization (IP) target. Surface and cross-borehole electrical imaging (conductivity and IP) was conducted at a PRB installed at the U.S. Department of Energy's Kansas City plant. Poor signal strength (25% of measurements exceeding 89% reciprocal error) and insensitivity at depth, which results from current channeling in the highly conductive iron, limited surface imaging. Crosshole 2D and 3D electrical measurements were highly effective at defining an accurate, approximately 0.3-m resolution, cross-sectional image of the barrier in-situ. Both the conductivity and IP images reveal the barrier geometry. Crosshole images obtained for seven panels along the barrier suggest variability in iron emplacement along the installation. On five panels the PRB structure is imaged as a conductive feature exceeding 1 S/m. However, on two panels the conductivity in the assumed vicinity of the PRB is less than 1 S/m. The images also suggest variability in the integrity of the contact between the PRB and bedrock. This noninvasive, in-situ evaluation of barrier geometry using conductivity/IP has broad implications for the long-term monitoring of PRB performance as a method of hydrocarbon removal.

Smaling, E. M. A. and L. O. Fresco (1993). "A Decision-Support Model for Monitoring Nutrient Balances under Agricultural Land-Use (Nutmon)." Geoderma **60**(1-4): 235-256. <Go to ISI>://A1993MR14800016

A quantitative model of the balance between inputs and outputs of nitrogen, phosphorus and potassium in African land use systems (NUTBAL) was recently developed at two scales: supra-national (38 sub-Saharan African countries) and regional (Kisii District, Kenya). Calculating inputs (mineral fertilizer, organic manure, wet and dry deposition, biological nitrogen fixation, sedimentation) and outputs (removal of above-ground crop parts, leaching, denitrification, water erosion) led to the conclusion that there are considerable net fertility losses in each growing period. In this paper, NUTBAL is elaborated into a decision-support model (NUTMON) to monitor the effects of changing land use, and suggest interventions that improve the nutrient balance. As input and output determinants cannot all be quantified equally well, the model recognizes primary data, estimates, and assumptions. The NUTMON determinants are mostly scale-neutral and can therefore be used to monitor nutrient balances at farm, regional, national and supra-national level. This is essential since the hierarchical levels interact. A number of recent interventions at the regional level (Kisii District, Kenya) are elaborated, including national fertilizer and produce price policies, fertilizer supply in small packages, zero-grazing, agroforestry, soil conservation measures, and increasing fertilizer use efficiency. It is shown that a major nutrient conservation effort in Kisii reduces nutrient depletion by approximately 50%, but does not entirely redress the N and K balance. To achieve the latter without reducing crop production, 75% of the district would have to be converted to a rotation system of maize and green manure cover crops, whereas 25% can remain under tea. NUTMON has the potential to become a dynamic tool for land use policies, geared towards a balanced nutrient status in African land use systems. It can assist decision makers in determining the effects of current and alternative land use scenarios, taking account of both the productivity as well as the long-term sustainability of agro-ecosystems.

Sparling, G. and L. Schipper (2004). "Soil quality monitoring in New Zealand: trends and issues arising from a broad-scale survey." Agriculture Ecosystems & Environment **104**(3): 545-552. <Go to ISI>://000225747400015

Interpretation of national-scale surveys is needed to determine long term impacts of land use on soil quality. We report the findings of a survey of soil quality in New Zealand conducted 1995-2001. The survey covered 511 sites representative of 98% of New Zealand's land area. Land uses included: arable cropping and horticulture, mixed cropping, drystock pasture (sheep, beef or deer), dairy pasture, tussock grassland, plantation forestry, and indigenous forest, occurring on 12 soil orders. At each site, land-use and soil profile were described, and the topsoil (0-10 cm depth) analyzed for total C, total N, anaerobically mineralisable N, pH, Olsen P, bulk density and macroporosity. Pastoral land and indigenous forests had similar total C contents (56-67 mg cm⁻³). Mean N contents under pastures were 4.3-5.9 mg cm⁻³, whereas all other land uses were <3.5 mg cm⁻³. Olsen P was much greater under pastures and cropping (44-49 mg cm⁻³) than under plantation and indigenous forests (ca. 10 mg cm⁻³). Indigenous and plantation forest soils were the most acidic (mean pH 5.4), and cropping soils the most alkaline (mean pH 6.2). Indigenous forests had the lowest bulk density, (0.76 Mg m⁻³), and mixed cropping soils the highest (1.22 Mg m⁻³). Macroporosity was variable (9.3-25.6% (v/v)). Overall, 80% of the soil properties fell within target ranges identified as desirable to maintain soil quality for production and environmental objectives. There was widespread but moderate compaction under pastures and cropping, depletion of total C under cropping, and nutrient imbalance (usually excess P) under cropping and dairy pastures. The study identified soil, land use and management combinations of concern for loss of soil quality, and provided benchmark data against which to measure change. (C) 2004 Elsevier B.V. All rights reserved.

Spurny, F. and T. Dachev (2003). Long-term monitoring of the onboard aircraft exposure level with a Si-diode based spectrometer. Space Life Sciences: Structure and Dynamics of the Global Space Radiation Field at Aircraft Altitudes. Kidlington, PERGAMON-ELSEVIER SCIENCE LTD. **32**: pp 53-58 <Go to ISI>://000185946800007

The radiation fields onboard aircraft are complex (EURADOS, 1996), and several methods are used to characterise them for radiation protection. We have tested a spectrometer based on Si-diode at different sources and accelerator facilities. The energy deposited in the diode is analysed to estimate the contribution of different radiations to dosimetry quantities. The spectrum of energy deposition events onboard aircraft is similar to that registered in the CERN high-energy reference field. We used this similarity to determine the correction factors to appreciate radiation protection quantities from the results of onboard measurements. During 2001-2002, the spectrometer was used to acquire measurements onboard commercial aircraft during five long-term exposures. All necessary flight parameters were acquired; thus permitting

calculations of the onboard effective dose and/or ambient dose equivalent by means of both the CAR16 and the EPCARD codes and comparison with the results of the measurements. It was found that the apparent ambient dose equivalent values from measured data are in reasonable agreement with the results of calculations. Quantitative analysis of this agreement as a function of flight parameters (geomagnetic position, solar activity variations, etc.) is presented. During one flight, an important solar event (GLE 60 on 15 April 2001) was recorded by the spectrometer. In some other cases the measurements during a Forbush decreases were acquired. These extremes were well registered by the equipment and the data obtained are analyzed. (C) 2003 COSPAR. Published by Elsevier Ltd. All rights reserved.

Steiner, M., J. A. Smith and R. Uijlenhoet (2004). "A microphysical interpretation of radar reflectivity-rain rate relationships." *Journal of the Atmospheric Sciences* **61**(10): 1114-1131. <Go to ISI>://000221380800002

The microphysical aspects of the relationship between radar reflectivity Z and rainfall rate R are examined. Various concepts discussed in the literature are integrated into a coherent analytical framework and discussed with a focus on the interpretability of $Z - R$ relations from a microphysical point of view. The forward problem of analytically characterizing the $Z - R$ relationship based on exponential, gamma, and monodisperse raindrop size distributions is highlighted as well as the inverse problem of a microphysical interpretation of empirically obtained $Z - R$ relation coefficients. Three special modes that a $Z - R$ relationship may attain are revealed, depending on whether the variability of the raindrop size distribution is governed by variations of drop number density, drop size, or a coordinated combination thereof with constant ratio of mean drop size and number density. A rain parameter diagram is presented that assists in diagnosing these microphysical modes. The number-controlled case results in linear $Z - R$ relations that have been observed for steady and statistically homogeneous or equilibrium rainfall conditions. Most rainfall situations, however, exhibit a variability of drop spectra that is facilitated by a mix of variations of drop size and number density, which results in the well-known power-law $Z - R$ relationships. Significant uncertainties are found to be associated with the retrieval of microphysical information from the $Z - R$ relation coefficients, but even more so with shortcomings of the measurement of rainfall information and the subsequent processing of that data to obtain a $Z - R$ relation. Given a proper consideration of the uncertainties, however, valuable microphysical information may be obtained, particularly as a result of long-term monitoring of rainfall for fixed observational settings but also through comparisons among different climatic rainfall regimes.

Steven, M. D., T. J. Malthus, F. Baret, H. Xu and M. J. Chopping (2003). "Intercalibration of vegetation indices from different sensor systems." *Remote Sensing of Environment* **88**(4): 412-422. <Go to ISI>://000187347100005

Spectroradiometric measurements were made over a range of crop canopy densities, soil backgrounds and foliage colour. The reflected spectral radiances were convoluted with the spectral response functions of a range of satellite instruments to simulate their responses. When Normalised Difference Vegetation Indices (NDVI) from the different instruments were compared, they varied by a few percent, but the values were strongly linearly related, allowing vegetation indices from one instrument to be intercalibrated against another. A table of conversion coefficients is presented for AVHRR, ATSR-2, Landsat MSS, TM and ETM+, SPOT-2 and SPOT-4 HRV, IRS, IKONOS, SEAWIFS, MISR, MODIS, POLDER, Quickbird and MERIS (see Appendix A for glossary of acronyms). The same set of coefficients was found to apply, within the margin of error of the analysis, for the Soil Adjusted Vegetation Index SAVI. The relationships for SPOT vs. TM and for ATSR-2 vs. AVHRR were directly validated by comparison of atmospherically corrected image data. The results indicate that vegetation indices can be interconverted to a precision of 1-2%. This result offers improved opportunities for monitoring crops through the growing season and the prospects of better continuity of long-term monitoring of vegetation responses to environmental change. (C) 2003 Elsevier Inc. All rights reserved.

Strang, I. and M. Dienst (2004). "Effects of water level at Lake Constance on the *Deschampsietum rhenanae* from 1989 to 2003." *Limnologia* **34**(1-2): 22-28. <Go to ISI>://000222030800004

The *Deschampsietum rhenanae* is an endemic and endangered lakeshore community growing in the upper littoral of Lake Constance, the occurrence of which has been reduced dramatically during the last 100 years. The existence of this community depends on the seasonal water level changes of the unregulated, prealpine Lake Constance. Long-term monitoring indicates that the typical species of the *Deschampsietum rhenanae* and their competitors may be strongly affected by extreme water levels. An earlier onset of the water level increase in spring could potentially pose a threat to the *Deschampsietum rhenanae*, especially if the water level rises before seed ripening in the *Deschampsietum rhenanae*.

Suess, O., T. Kombos, O. Ciklatekerlio, R. Stendel, S. Suess and M. Brock (2002). "Impact of brain shift on intraoperative neurophysiological monitoring with cortical strip electrodes." *Acta Neurochirurgica* **144**(12): 1279-1289. <Go to ISI>://000180203300008

Background. Intraoperative neurophysiological monitoring has become the standard procedure for locating eloquent regions of the brain. Such continuous electrical stimulation of motor pathways is usually applied by means of flat silicon-embedded electrodes placed directly on the motor cortex. However, shifting of the silicon strip on the cortical surface as well as electrode displacement due to brain shift underneath the electrode can lead to inaccurate recordings not directly caused by intraoperative impairment of the motor cortex or the motor pathways. **Method.** This prospective study was conducted to quantify cortical brain shift during open cranial surgery and to assess its impact on electrode positioning in 31 procedures near the precentral gyrus. Three groups of different lesion volumes were distinguished. Movement of the cortex between opening of the dura and completion of tumor removal as well as cortical electrode shifting were digitally measured and analyzed. **Findings.** Cortical surface structures evidenced a significantly larger shift (up to 23.4 mm) in comparison to the electrode strips (up to 4.2 mm) in lesions with a volume of over 20 ml. Cortex shifting highly correlated with lesion volume, whereas strip electrode movement was almost unidirectional and did not differ significantly among the three groups. However, the way they were placed (completely on the cortex vs. partly underlying or overlapping the craniotomy borders) affected the magnitude of their intraoperative displacement. As a consequence, 3 of the 31 cases (9.3%) showed a significant change in the recorded motor responses due to intraoperative dislocation of the stimulating electrode. **Interpretation.** Changes in the location of cerebral structures due to intraoperative brain shift may exert a marked influence on intraoperative neurophysiological monitoring if cortical strip electrodes are used. Therefore, long-term monitoring of the central region requires continuous checking of the position of stimulating electrodes and, if necessary, correction of their location.

Sutton, M. A., B. Miners, Y. S. Tang, C. Milford, G. P. Wyers, J. H. Duyzer and D. Fowler (2001). "Comparison of low cost measurement techniques for long-term monitoring of atmospheric ammonia." *Journal of Environmental Monitoring* **3**(5): 446-453. <Go to ISI>://000171794600004

An inter-comparison of techniques for long-term sampling of atmospheric ammonia (NH₃) was conducted with a view to establishing a national network with > 50 sites. Key requirements were for: a low cost system, simplicity and durability to enable a postal exchange with local site operators, a precision of < +/- 20% for monthly sampling at expected NH₃ concentrations of 1-2 $\mu\text{g m}^{-3}$, a detection limit sufficient to resolve the small NH₃ concentrations (< 0.2 $\mu\text{g m}^{-3}$) expected in remote parts of the UK, and a quantitative means to establish quality control. Five sampling methods were compared: A, a commercially available membrane diffusion tube (exposed in triplicate), with membranes removed immediately after sampling; B, the above method, with the membranes left in place until analysis; C, open-ended diffusion tubes (exposed with 4 replicates); D, a new active sampling diffusion denuder system, and E, an active sampling bubbler system. Method D consisted of two 0.1 in acid coated glass denuders in series with sampling at approximate to 0.31 min⁻¹. These methods were deployed at 6 locations in the UK and the Netherlands and compared against reference estimates. Method D was the most precise and sensitive of the techniques compared, with a detection limit of < 0.1 $\mu\text{g m}^{-3}$. The bubbler provided a less precise estimate of NH₃ concentration, and also suffered several practical drawbacks. The diffusion tubes were found to correlate with the reference at high concentrations (> 3 $\mu\text{g m}^{-3}$), but were less precise and overestimated NH₃ at smaller concentrations. Of the passive methods, A was the most precise and C the least precise. On the basis of the results, method D has been implemented in the national network, together with application of method A to explore spatial variability in regions with expected high NH₃ concentrations.

Suyehiro, K., H. Mikada and K. Asakawa (2003). "Japanese seafloor observing systems: Present and future." *Marine Technology Society Journal* **37**(3): 102-114. <Go to ISI>://000187402800017

We describe in this article Japanese efforts toward building and operating long-term seafloor observing systems. Greater details are given to those systems in which the authors have been involved. The main impetus for obtaining long-term time-series from the ocean floor in Japan has been earthquake monitoring for risk assessment and hazard mitigation. Most of the earthquake energy is released near and along the oceanic trenches offshore Japan, and large inter-plate earthquakes recur at decades to 100-year intervals, which are a great threat to the society. The first cabled observatory was laid in 1978 by the Japan Meteorological Agency to monitor seismicity in an area where a M-8 earthquake has been expected to occur. Since then, national agencies and universities established more cabled observing systems (8 systems as of 2003). The very reason of seismic activity is the plate subduction, which causes numerous geophysically interesting activities including fluid vents, biological communities, and magma movements. Realizing all these processes require long-term monitoring to lead to eventual understanding of their dynamics, efforts were made particularly at JAMSTEC to establish multiple-sensor observing systems. There are now certain directions towards the future. One is establishing monitoring systems in deep ocean boreholes, which will become possible by the new Integrated Ocean Drilling Program (2003-). Another is enabling many sensors to be deployed at an appropriate spatial density so that networks realized on land can be extended over the surrounding oceans. The third is establishing observatories as components of global networks.

Switalski, T. A., J. A. Bissonette, T. H. DeLuca, C. H. Luce and M. A. Madej (2004). "Benefits and impacts of road removal." *Frontiers in Ecology and the Environment* **2**(1): 21-28. <Go to ISI>://000221791800018

Road removal is being used to mitigate the physical and ecological impacts of roads and to restore both public and private lands. Although many federal and state agencies and private landowners have created protocols for road removal and priorities for restoration, research has not kept pace with the rate of removal. Some research has been conducted on hydrologic and geomorphic restoration following road removal, but no studies have directly addressed restoring wildlife habitat. Road removal creates a short-term disturbance which may temporarily increase sediment loss. However, long-term monitoring and initial research have shown that road removal reduces chronic erosion and the risk of landslides. We review the hydrologic, geomorphic, and ecological benefits and impacts of three methods of road removal, identify knowledge gaps, and propose questions for future research, which is urgently needed to quantify how effectively road removal restores terrestrial, riparian, and aquatic habitat and other ecosystem processes.

Takahashi, K. (2003). "Effects of climatic conditions on shoot elongation of alpine dwarf pine (*Pinus pumila*) at its upper and lower altitudinal limits in central Japan." *Arctic Antarctic and Alpine Research* **35**(1): 1-7. <Go to ISI>://000181915900001

The effects of climatic conditions on the shoot elongation of alpine dwarf pine (*Pinus pumila*) were examined at its lower and upper altitudinal limits on Mt. Norikura (2500 and 2840 m a.s.l.) and Mt. Shogigashira (2640 and 2675 m a.s.l.) in central Japan. Altitudinal forest-structural changes were also described. Shoot elongation and stem height of *P. pumila* increased with decreasing altitude, but its abundance was markedly decreased at the altitudinal ecotone between the upper *P. pumila* zone and the lower *Betula ermanii* zone because of the suppression by tall *B. ermanii*. Thus, the lower altitudinal limit of *P. pumila* was probably determined by the competition with *B. ermanii*. The interannual variation in the shoot elongation of *P. pumila* was related to climatic conditions; long shoot length was associated with high summer temperatures of the previous year at both the upper and lower altitudinal limits on the two mountains. In addition, rates of the increase of shoot elongation in response to the increase of air temperature were not different between the upper and lower altitudinal limits. Thus, the increase of summer temperatures would enhance the growth of *P. pumila* from its upper to lower altitudinal limits. However, it is harder to predict the altitudinal distribution shift of *P. pumila* due to environmental change because its lower altitudinal limit is largely affected by competition with *B. ermanii*. Therefore, this study concluded that long-term monitoring of the population dynamics at the *P. pumila*-*B. ermanii* ecotone is necessary to predict the distribution shift of *P. pumila*.

Takahashi, K., N. Fujitani and M. Yanada (2002). "Long term monitoring of particle fluxes in the Bering Sea and the central subarctic Pacific Ocean, 1990-2000." *Progress in Oceanography* **55**(1-2): 95-112. <Go to ISI>://000178920700007

A time-series particle flux study has been conducted at two sites near the Aleutian Islands: Station AB in the Bering Sea for nine years (1990-1999) and Station SA in the central subarctic Pacific for ten years (1990-2000). Significant variability

in seasonal and inter-annual particle flux was observed at both stations. The annual primary flux maxima that occurred during spring through summer tended to vary considerably in their timing and magnitude, whereas the secondary maxima in fall tended to be fairly consistent of timing and flux levels. Biogenic opal contributed to a major portion of the time-series fluxes. Especially diatoms such as *Neodenticula seminae* are important in the biogenic opal fluxes and drive bulk of the biological system. Calcium carbonate fluxes were comprised of six species of planktonic foraminifera and mainly two species of coccolithophores. At Station AB, the fall CaCO₃ flux maxima were higher than those of spring, whereas the magnitudes of the CaCO₃ flux maxima were similar during both spring and fall at Station SA. The seasonal change in CaCO₃ flux was significantly different from that of biogenic opal. The planktonic foraminiferal contribution was greater than that of coccoliths to the total CaCO₃ flux. (C) 2002 Elsevier Science Ltd. All rights reserved.

Taniegra, E. D. (2004). "Hyperparathyroidism." *American Family Physician* **69**(2): 333-339. <Go to ISI>://000188389600007
Primary hyperparathyroidism is the most frequent cause of hypercalcemia in ambulatory patients. The condition is most common in postmenopausal women, although it can occur in persons of all ages, including pregnant women. If symptoms are present, they are attributable to hypercalcemia and may include weakness, easy fatigability, anorexia, or anxiety. However, most persons have no symptoms, and primary hyperparathyroidism usually is diagnosed after an elevated serum calcium level is found incidentally on multiphasic chemistry panel testing. Persistent hypercalcemia and an elevated serum parathyroid hormone level are the diagnostic criteria for primary hyperparathyroidism. Other causes of hypercalcemia are rare, and usually are associated with low (or sometimes normal) parathyroid hormone levels. Malignancy is the most frequent cause of hypercalcemia in hospitalized patients. Parathyroidectomy is the definitive treatment for primary hyperparathyroidism. When performed by experienced endocrine surgeons, the procedure has success rates of 90 to 95 percent and a low rate of complications. Asymptomatic patients who decline surgery, and meet criteria for medical management must commit to conscientious long-term monitoring. Any unexplained elevation of the serum calcium level should be evaluated promptly to prevent complications from hypercalcemia. Copyright (C) 2004 American Academy of Family Physicians.

Tasker, G. L. and F. Wojnarowska (2003). "Lichen sclerosis." *Clinical and Experimental Dermatology* **28**(2): 128-133. <Go to ISI>://000181789700002

Lichen sclerosis is a chronic skin condition, which offers many challenges to the clinician. It affects men, women and children, and usually occurs in the anogenital area. The clinical signs can be confused with those seen in sexual abuse in children. The underlying cause is unknown; however, there is a strong association with autoimmune disorders, and immunogenetic studies have demonstrated a link with HLA DQ7. Patients suffer significant morbidity as a consequence of the intractable symptoms, physical scarring and psychosexual damage. Support groups may be helpful for some patients. Potent topical corticosteroids have been shown to be effective. There is a 5% incidence of squamous cell carcinoma, and all suspicious lesions should be biopsied. It is unclear whether the risk of malignancy is changed with the use of topical corticosteroids, as there is a potential risk of triggering a latent infection of human papillomavirus. A multidisciplinary approach to care is required and ideally all patients should attend a dedicated clinic and be offered long-term monitoring.

Taylor, L. A., J. S. Kreutzer, S. R. Demm and M. A. Meade (2003). "Traumatic brain injury and substance abuse: A review and analysis of the literature." *Neuropsychological Rehabilitation* **13**(1-2): 165-188. <Go to ISI>://000182106500010

Traumatic brain injury (TBI) is a leading cause of death and disability worldwide. Accidents are a major cause of brain injury, and many accidents are alcohol or drug related. Evidence indicates that a vast majority of victims test positive for alcohol or illicit drugs at the time of hospital admission. Research also suggests that a majority of TBI survivors were moderate to heavy drinkers pre-injury. This manuscript reviews literature on pre- and post-injury substance use patterns, abuse risk factors, and dangers of post-injury use. Assessment is discussed in detail with information provided on the need for quantitative assessment, records review, corroboration, and long-term monitoring. Information is also provided on critical features of treatment, prevention, and education, and on the role of psychologists in substance abuse assessment and treatment. The manuscript concludes with a section addressing issues, questions, and concerns commonly encountered by clinicians.

Thiruchelvam, N., M. L. Godley, M. K. Farrugia and P. M. Cuckow (2004). "A preliminary study of natural-fill radiotelemetered ovine fetal cystometry." *Biu International* **93**(3): 382-387. <Go to ISI>://000188810500031

OBJECTIVE To determine whether fetal cystometric studies by radiotelemetry are feasible in the fetal lamb, and potentially suitable for chronically monitoring fetal bladder pressures in an experimental fetal model of bladder outlet obstruction (BOO), as in utero BOO (e.g. caused by posterior urethral valves) results in significant postnatal bladder dysfunction but the pathophysiological progression of fetal bladder maldevelopment remains poorly understood. **MATERIALS AND METHODS** The procedure required fetal sheep surgery and anaesthesia. Radiotelemetry implants comprised catheters that transmitted pressure fluctuations to an implant body; data were then transmitted using radio frequency to a receiver that passed this information to a computer. Four fetuses were used with different methods of catheter placement to optimize the technique. **RESULTS** Recordings were possible in three of the four sheep; during observation there were: (i) quiet periods with no abdominal or bladder pressure rises; (ii) synchronous activity in the bladder and abdomen; and (iii) discriminate activity, associated with intravesical activity only. Four patterns of discriminate bladder activity were observed, defined as void, immature void, staccato activity and 'unstable' type activity. **CONCLUSIONS** Radiotelemetry cystometry for long-term monitoring is feasible in the experimental fetus without causing death or morbidity, or inhibiting growth. The method can discriminate reproducible patterns of detrusor activity. Recorded 'voiding' types were consistent between experiments and as reported in other fetal animal studies.

Thompson, A. A. and B. D. Mapstone (2002). "Intra- versus inter-annual variation in counts of reef fishes and interpretations of long-term monitoring studies." *Marine Ecology-Progress Series* **232**: 247-257. <Go to ISI>://000176123900020

Many sampling strategies have been proposed as appropriate for describing spatial patterns in marine organisms. There remain, however, many problems with the description, analysis and interpretation of temporal variation in abundances of organisms. In particular, there is a need to understand temporal error in the estimation of abundance of mobile organisms. In this paper we report estimates of temporal variation in abundances of tropical reef fishes attributable to sampling error at

diurnal, daily and 'monthly' scales and compare these to inter-annual variation that might arise from processes such as mortality and recruitment. Uncertainty in estimates taken from the same sites over consecutive days was large for several species and accounted for the majority of error in estimates of abundance within years. Sources of error in estimates of abundance are discussed with consideration of the implications for long-term sampling and monitoring of fish assemblages. Short-term temporal variation must be considered along with spatial variation in the design and interpretation of temporal studies of mobile species.

Thompson, J. R., H. R. Sorenson, H. Gavin and A. Refsgaard (2004). "Application of the coupled MIKE SHE/MIKE 11 modelling system to a lowland wet grassland in southeast England." *Journal of Hydrology* **293**(1-4): 151-179. <Go to ISI>://000221917600010
Hydrological modifications frequently result in wetland loss and degradation while wetland management, restoration and creation schemes rely upon further hydrological manipulations. These schemes can benefit from models which can accurately represent often complex wetland hydrological situations. Although the potential of the physically based, distributed model MIKE SHE to model wetlands has been demonstrated, a number of inadequacies in its channel flow component have been identified. These include difficulties in representing control structures and simulating inundation from channels. A coupling has been developed between MIKE SHE and the MIKE 11 hydraulic modelling system. This paper reports a coupled MIKE SHE/MIKE 11 model developed for a lowland wet grassland, the Elmley Marshes, in southeast England. Long term monitoring, supplemented by selected secondary sources, provided the necessary input, calibration and validation data. A procedure was developed to evaluate evaporation from ditch surfaces which could not be represented dynamically within MIKE 11. Two consecutive 18-month periods were used for model calibration and validation which were based upon comparisons of observed and simulated groundwater depths and ditch water levels. Model results were generally consistent with the observed data and reproduced the seasonal dynamics of groundwater and ditch water. The close association between flooding and both groundwater and ditch water levels was demonstrated. Topographic depressions are important for the initiation of flooding and are responsible for much of the shallow surface water in areas isolated from ditches. Deeper flooding occurs in areas which are inundated from these ditches. Results suggested that improvements could be made to the MIKE SHE bypass flow routine to enable it to more accurately represent macropore flow associated with soil cracking and swelling. Dynamic calculation of evaporation from ditch water surfaces would enhance the ability of the model to explore alternative water level management and climate change scenarios. The potential use of the model to investigate these scenarios is outlined. (C) 2004 Elsevier B.V. All rights reserved.

Thurston, J. M., E. D. Williams and A. E. Johnston (1976). "Modern Developments in an Experiment on Permanent Grassland Started in 1856 - Effects of Fertilizers and Lime on Botanical Composition and Crop and Soil Analyses." *Annales Agronomiques* **27**(5-6): 1043-1082. <Go to ISI>://A1976DN70300031

Timsit, O., B. Sylvand and J. C. Lefevre (2004). "Intertidal macrozoobenthos evolution of the 'Baie des Veys' between 1985 and 2000." *Comptes Rendus Biologies* **327**(1): 51-64. <Go to ISI>://000220022800006

Intertidal macrozoobenthos evolution of the 'Baie des Veys' between 1985 and 2000. The distribution of intertidal macrozoobenthos in the 'Baie des Veys' (French coast of the eastern English Channel) has been studied in 2000. Results were compared with those of 1985, which are included in a long-term monitoring program established since 1973. The populations remained distributed along an estuarine-marine gradient, with a particularity on the eastern side, which is isolated from the rest of the bay by a river channel. The western and central tidal flats became more subjected by marine influence, which led to a homogenisation of the benthic communities. Oyster farming locally caused a fast decrease of the typical eastern community, which was characterized by *Scoloplos armiger* and *Urothoe poseidonis*.

Tryjanowski, P. (2000). "Changes in breeding populations of some farmland birds in W Poland in relation to changes in crop structure, weather conditions and number of predators." *Folia Zoologica* **49**(4): 305-315. <Go to ISI>://000166352100006
The breeding populations of *Acrocephalus palustris*, *Alauda arvensis*, *Carduelis cannabina*, *Carduelis carduelis*, *Emberiza citrinella*, *Fringilla coelebs*, *Miliaria calandra*, *Motacilla alba*, *Motacilla flava*, *Saxicola ruberta*, *Sylvia communis*, and *Turdus merula* were censused yearly from 1987 through 1997 by territory mapping on a 315 ha of intensively used farmland in W Poland. Five of the 12 species (*A. arvensis*, *E. citrinella*, *M. alba*, *M. flava* and *S. communis*) showed long-term decreasing trends, only one species - *M. calandra* increased in number. Analysis of the effects of changes in crop structure, margin habitats, weather conditions and predation on breeding bird populations revealed that the most important factor was the contribution of margin habitats in the area studied, which had positive effects on five species and negative in one case. In the case of the most abundant species (*A. arvensis*), predatory pressure was the most important factor controlling the population size.

Tseng, H. F., H. F. Tan and C. K. Chang (2003). "Varicella vaccine safety, incidence of breakthrough, and factors associated with breakthrough in Taiwan." *American Journal of Infection Control* **31**(3): 151-156. <Go to ISI>://000182981400004
Background: Varicella vaccine was first available in Taiwan in 1997. The aims of this study were to investigate varicella vaccine safety and occurrence of breakthrough in Taiwan during the first 3 years. The adverse events, incidence of, breakthrough, and factors associated with breakthrough were analyzed. Methods: A personal interview using a structured questionnaire was conducted for the parents of 1248 children less than 12 years old who were vaccinated between 1998 and 2000. Incidence of adverse events and breakthrough were presented and factors associated with breakthrough were estimated by logistic regression. Results: There were 27 (2.16%) breakthrough cases occurring during the maximum follow up period of 31 months, including 22 very mild or mild cases, 3 moderately severe cases, and 2 severe cases. Compared with those who did not have confirmed history of varicella exposure after vaccination, children with such exposure were approximately 28 times as likely to have breakthrough varicella develop (adjusted odds ratio = 27.75, 95% confidence interval: 6.12-125.78, P = .00). There were 91 (7.3 %) reported cases of adverse events, including rash, fever, and pain or swelling, occurring within 2 weeks of vaccination. Conclusions: Although rare adverse events cannot be well-quantified in this study, the results suggest that, at least in the short term, varicella vaccine is well-tolerated and effective in Taiwan. Long-term monitoring program is necessary to ensure the safety of this vaccine.

Tucek, M., J. Tenglerova, B. Kollarova, M. Kvasnickova, K. Maxa, I. Mohyluk, E. Svandova, O. Topolcan, Z. Vlasak and M. Cikrt (2002). "Effect of acrylate chemistry on human health." International Archives of Occupational and Environmental Health **75**: S67-S72. <Go to ISI>://000180063700012

Objectives: The prospective cohort study of 1992-1999 describes the effect of occupational exposure to chemical substances in the production of acrylic acid, acrylic acid esters and acrylate dispersions at the various workplaces of one chemical plant. Methods: Exposure to selected chemicals (acrylonitrile, n-butanol, butyl acrylate, ethyl acrylate, methyl acrylate, methyl methacrylate, toluene, and styrene) was determined by personal passive dosimetry (GC/MS method). The annual examinations included general health, by guided interview, a general medical examination, hematological and biochemical examinations, examination of the parameters of serum immunity and selected tumor markers, and spirometry. The authors also repeatedly performed cytogenetic analysis of human peripheral lymphocytes. Results: The authors followed a group of 120 employees (60 exposed, 60 controls), mean age 40+/-8 years in both groups. with average period of exposure to chemicals (exposed group) 13+/-5 years. The measured concentrations of chemicals in the working atmosphere were generally low; maximum allowable concentrations (MAC) values or suggested limits of certain chemicals were occasionally exceeded (most frequently for butyl acrylate). The results of the examination of the workers over the 8 years have not revealed any marked differences between the exposed and control groups that could be attributable solely to the acrylate exposure. Conclusions: Exposure to chemical substances at the workplace was relatively low, the limits being exceeded only sporadically (each such case was investigated at the workplace). and the level of exposure continues to decrease gradually over the years. Considering the fact that the exposed individuals are expected to work for 23 additional years on average, we feel that long-term monitoring of selected health-related parameters, not including tumor markers, appears desirable. The examination of tumor markers has not contributed to the problem evaluation for a number of false-positive results.

Uhart, M. M., F. Quintana, W. B. Karesh and W. E. Braselton (2003). "Hematology, plasma biochemistry, and serosurvey for selected infectious agents in southern giant petrels from Patagonia, Argentina." Journal of Wildlife Diseases **39**(2): 359-365. <Go to ISI>://000184103200014

In conjunction with reproductive and feeding ecology studies on southern giant petrels (SGP, *Macronectes giganteus*) blood samples were collected for baseline health evaluations. Twenty-five adult SGP from a breeding colony in Chubut, Argentina, were sampled during two consecutive breeding seasons, 1999-2000 (n = 15) and 2000-01 (n = 10). Values for hematology, plasma biochemistry, and minerals are described for 20 birds in apparent good physical condition. A serologic survey of exposure to selected infectious agents was also conducted on all 25 birds sampled. Southern giant petrels were serologically negative for evidence of exposure to infections laryngotracheitis virus, avian encephalomyelitis virus, avian influenza virus, avian reovirus, infectious bursal disease virus, infectious bronchitis virus, paramyxovirus 1, 2, and 3 virus, Chlamydia, and Aspergillus. Antibodies to avian adenovirus were found in 14% of SGP during the first sampling season, and 60% in the second year. Additionally, all birds were negative for antibodies to *Salmonella pullorum* at the first sampling date, but 90% had low titers the following breeding season. This study contributes to understanding the health status of South Atlantic seabirds and to establishment of baseline information for SGP. Long-term monitoring of pelagic predator-scavenger seabirds such as SGP should be established for the surveillance of marine ecosystem health.

Ushimaru, A. and K. Matsui (2001). "Sex change in tree species: long-term monitoring of sex expression in *Acer rufinerve*." Nordic Journal of Botany **21**(4): 397-399. <Go to ISI>://000174425200008

We monitored sex expression in *Acer rufinerve* from 1986 to 1999, in order to study branch-autonomous sex changes in tree species. During this observation period, 70 of 338 stems (20.7%) changed sexual expression. Fifty of these sex-changed stems exhibited monoecism (having both female and male branches) in the course of the sex change, while the remaining stems changed directly from male to female or vice versa. A sex change resulting in monoecism was called a partial sex change and a total male/female change was referred to as a complete sex change. The mean diameter at breast height of stems that partially changed sex was significantly greater than that of stems that changed sex completely. Thus, it was primarily large stems with many branches that underwent partial sex changes. These findings suggest that sex change is a branch autonomous event in *A. rufinerve* and underline the importance of taking branching structure into account when studying sex change in trees.

van Dyk, E. E., E. L. Meyer, F. J. Vorster and A. W. R. Leitch (2002). "Long-term monitoring of photovoltaic devices." Renewable Energy **25**(2): 183-197. <Go to ISI>://000171416100002

For photovoltaic (PV) devices to operate successfully over an expected lifespan of 30 years, much research is needed in all aspects of these devices. This study is concerned with the monitoring of the performance and degradation of PV devices over extended periods as well as the effect of meteorological conditions on device performance. The PV devices used in this study comprise different cell technologies and designs. The performance of conventional flat plate modules was monitored over a 15-month period and that of a PV concentrator array over a 13-month period. The results of this performance monitoring are presented in this paper. Degradation mechanisms of PV devices are also discussed. This study showed that, as expected, the power ratings of PV devices do not usually give an accurate indication of their performance outdoors. Results obtained also showed that meteorological conditions could cause an 18% reduction of a module's potential power. A degradation monitoring procedure revealed potential degradation mechanisms, such as mismatched cells, hot spot formation and low cell shunt resistances on some modules. A comparative study on the PV concentrator modules showed that the concentrator modules produced much less energy than their rated energy when operating outdoors. The energy performance of a tracked flat plate module vastly exceeded the concentrator modules' performance. (C) 2001 Elsevier Science Ltd. All rights reserved.

Vaughan, S., R. Edelson and R. S. Warwick (2004). "Chandra observations of five X-ray transient galactic nuclei." Monthly Notices of the Royal Astronomical Society **349**(1): L1-L5. <Go to ISI>://000220152700001

We report on exploratory Chandra observations of five galactic nuclei that were found to be X-ray bright during the ROSAT All-Sky Survey (with L-X greater than or similar to 10(43) erg s(-1)) but subsequently exhibited a dramatic decline in X-ray luminosity. Very little is known about the post-outburst X-ray properties of these enigmatic sources. In all five cases Chandra detects an X-ray source positionally coincident with the nucleus of the host galaxy. The spectrum of the brightest

source (IC 3599) appears consistent with a steep power law (Gamma similar to 3.6). The other sources have too few counts to extract individual, well-determined spectra, but their X-ray spectra appear flatter (Gamma similar to 2) on average. The Chandra fluxes are similar to 10(2)-10(3) fainter than was observed during the outburst (up to 12 yr previously). That all post-outburst X-ray observations have seen a similarly low X-ray luminosities is consistent with these sources having 'switched' to a persistent low-luminosity state. Unfortunately the relative dearth of long-term monitoring and other data mean that the physical mechanism responsible for this spectacular behaviour is still highly unconstrained.

Viglizzo, E. F., F. Lertora, A. J. Pordomingo, J. N. Bernardos, Z. E. Roberto and H. Del Valle (2001). "Ecological lessons and applications from one century of low external-input farming in the pampas of Argentina." *Agriculture Ecosystems & Environment* **83**(1-2): 65-81. <Go to ISI>://000166461200007

Ecology may benefit from long term, large scale experiments on low intensity farming to test theoretical principles and convert them into practical lessons. One century of land conversion in the Argentine pampas, and its effect on critical ecological properties, were analysed and discussed. Land transformation has resulted in significant changes of land use, land cover, energy flow, nutrient dynamics, hydrology, and the trade-offs between productivity, stability and sustainability. The analytical procedure involved the complementary utilisation of different data sources and approaches. The study was focused on large geographical scales: the entire pampas and its five ecoregions. Results were interpreted under the theoretical framework of succession in ecology. The historical conversion of natural grasslands into cultivated grasslands and croplands was not homogeneous, determining a variety of land use and land cover patterns. Due to its higher productivity, much more energy, nutrients and water were mobilised in the rolling pampas than in the other ecoregions. This study provides lessons about how the energy flow, the nutrient dynamics and the hydrological process are modified by land transformation under low external-input conditions. Technical coefficients to be applied in emerging fields of environment administration such as ecological-monitoring, environmental accounting and auditing, agro-ecological certification, land evaluation and allocation, and land management, can also be supplied by this kind of studies. (C) 2001 Elsevier Science B.V. All rights reserved.

Volkov, A. N. and V. G. Druzhinin (2001). "Long-term monitoring of cytogenetic aberrations in adolescents of a large industrial town." *Russian Journal of Genetics* **37**(9): 1087-1089. <Go to ISI>://000172213500015

Long-term cytogenetic monitoring was carried out in adolescents of the town of Kemerovo. In total, aberrant metaphase frequency increased from 1.53% in 1992 to 4.40% in 1996 in Kemerovo adolescents, being significantly higher than a control frequency from 1993 to 1996. In all samples, chromosome aberrations mostly included acentric fragments, while exchanges were rare. The highest number of aberrations per aberrant metaphase was 2 in Kemerovo adolescents and 1 in the control sample. The observed increase in total number of chromosome aberrations suggests that the mutagenic effect of chemical environmental pollutants on Kemerovo adolescents increased over the five years.

von Kruger, M. A. and D. H. Evans (2002). "Doppler ultrasound tracking instrument for monitoring blood flow velocity." *Ultrasound in Medicine and Biology* **28**(11-12): 1499-1508. <Go to ISI>://000180041500016

Doppler ultrasound (US) is potentially a valuable method for monitoring changes of blood flow velocity over a period of many minutes or even hours, but is seldom used in this way. One difficulty that may have contributed to this is the problem of maintaining a fixed geometry between the US beam and the blood vessel. A method of improving the success of monitoring might be to actively steer the US beam so as to maintain an adequate signal even when small displacements of the transducer occur. We have designed and built a prototype system for this purpose. The system comprises a continuous-wave phased-array transducer controlled by a purpose-built Doppler unit. The system constantly evaluates the quality of the returning Doppler signal in terms of total power and signal-to-noise ratio (SNR) (evaluated by assessing the quality of derived envelope signals), and steers the ultrasonic beam in a manner so as to improve the signal, should this be necessary. The system was tested in vitro, where the automatic tracking of the Doppler signal doubled the effective beam width of the transducer. Further developments that increase sensitivity and steering range should result in US Doppler systems that are better suited to long-term monitoring. (E-mail: dhe@le.ac.uk) (C) 2002 World Federation for Ultrasound in Medicine Biology.

Vyssotski, A. L., G. Dell'Omo, Poletaeva, II, D. L. Vyssotski, L. Minichiello, R. Klein, D. P. Wolfer and H. P. Lipp (2002). "Long-term monitoring of hippocampus-dependent behavior in naturalistic settings: Mutant mice lacking neurotrophin receptor TrkB in the forebrain show spatial learning but impaired behavioral flexibility." *Hippocampus* **12**(1): 27-38. <Go to ISI>://000174148700005

Previous behavioral studies (Minichiello et al., *Neuron* 1999;24:401-414) showed that mice deficient for the TrkB receptor in the forebrain were unable to learn a swimming navigation task with an invisible platform and were severely impaired in finding a visible platform in the same setup. Likewise, additional behavioral deficits suggested a malfunction of the hippocampus and proximally connected forebrain structures. In order to discriminate whether the behavioral impairment was caused either by deficits in spatial memory and learning, or alternatively by loss of behavioral flexibility, 8 *trkB* mutant, 13 wild-type, and 22 heterozygous mice were implanted with transponders and released for 21 days into a large outdoor pen (10 x 10 m). The enclosure contained 2 shelters and 8 computer-controlled feeder boxes, delivering food portions for every mouse only during their first visit. Every third day, mice received food ad libitum inside the shelters. All mice learned to patrol the boxes correctly within a few days. However, significant differences emerged during those days with free food available. Wild-type mice remained inside the shelters, while all homozygous mutants continued to patrol the boxes in their habitual way, the heterozygous mutants showing intermediate scores. These and previous data suggest that one of the natural functions of the mouse hippocampus is to mediate behavioral flexibility, and that TrkB receptors might play an essential role in maintaining the neuronal short-term plasticity necessary for this capacity. (C) 2002 Wiley-Liss, Inc.

Watson, I. and P. Novelty (2004). "Making the biodiversity monitoring system sustainable: Design issues for large-scale monitoring systems." *Austral Ecology* **29**(1): 16-30. <Go to ISI>://000220091200003

There is strong demand for information about the status of, and trends in, Australia's biodiversity. Almost inevitably, this demand for information has led to demand for a broad-scale monitoring system. However the decision to embark on a monitoring system should only be made once it has been established that a monitoring system is the optimal way to inform management. We stress the need to invest resources in assessing whether a monitoring system is necessary before

committing resources to the design and implementation of the system. Current debate associated with the design of a biodiversity monitoring system has similarities to the debate within the range management profession in the early 1970s. The experience with range monitoring shows that large-scale monitoring systems such as those being proposed will require considerable resources, recurrently expended into the distant future, but with only a limited ability to adapt to new demands. Those involved in any biodiversity monitoring system will need to understand the implications of investing in a long-term monitoring programme. Monitoring sustainability will only be possible if the monitoring system is itself sustainable. We discuss a number of issues that need to be addressed before the system is at all sustainable. These attributes are a mix of biophysical, social and institutional attributes and highlight the view that monitoring systems of the type being suggested comprise an unusual mixture of attributes not found in typical scientific activity. The present paper is not a technical manual, but rather considers some of the design issues associated with designing and implementing large-scale monitoring systems.

Waysbort, D., E. Manisterski, H. Leader, B. Manisterski and Y. Ashani (2004). "Laboratory setup for long-term monitoring of the volatilization of hazardous materials: Preliminary tests of O-ethyl-S-2-(N,N- diisopropylamino) ethyl methyl phosphonothiolate on asphalt." *Environmental Science & Technology* **38**(7): 2217-2223.<Go to ISI>://000220577800052

Contrary to commonly used pesticides, the rate of volatilization of extremely toxic chemicals such as the nerve agent O-ethyl S-2-(NN-diisopropylamino)ethyl methylphosphonothiolate (VX) cannot be readily obtained under environmental conditions due to its high mammalian toxicity that would require extraordinary precautions. An alternative is a laboratory setup that would be used to obtain environmentally relevant data required for risk assessment studies. In this paper we describe a newly designed climatic hood that enables control of temperature, humidity, and air velocity within less than +/- 0.5% fluctuations during continuous operation. The performance of the evaporation system together with the sampling and analytical procedures produced a meaningful concentration profile of vapors obtained from a 15 mg sample of VX dispersed as small droplets over a 10 x 16 cm piece of asphalt road. The released vapors amounted to approximately 30% of the applied mass, and its time course was best fitted to a triexponential curve with rate constants changing over time from 2.2 to 0.03 h⁻¹). The asphalt enhanced a specific degradation pathway of VX that is relatively minor in aqueous solutions. Results provide the first data on the volatilization of VX from samples of asphalt road, and offer an insight into VX behavior in the environment.

Weiler, M., H. Rauer, J. Knollenberg, L. Jorda and J. Helbert (2003). "The dust activity of comet C/1995 O1 (Hale-Bopp) between 3 AU and 13 AU from the Sun." *Astronomy & Astrophysics* **403**(1): 313-322.<Go to ISI>://000182561100033

The active comet C/1995 O1 (Hale-Bopp) was target of an optical long-term monitoring program carried out at the European Southern Observatory (ESO) (Rauer et al. 1997, 2003). Longslit spectra and images were obtained at heliocentric distances from 4.6 AU to 2.9 AU preperihelion and 2.8 AU to 12.8 AU postperihelion. Based on these data, the dust activity of comet Hale-Bopp is analysed. The color of the dust coma and the A_{frho} parameter are determined. A model for the dust release from the cometary nucleus is presented and used to compute dust production rates. The dust to gas ratio is determined.

Weiss, M., M. Koren-Michowitz, E. Segal and S. Ish-Shalom (2003). "Monitoring response to osteoporosis therapy with alendronate by a multisite ultrasound device." *Journal of Clinical Densitometry* **6**(3): 219-224.<Go to ISI>://000185611500004

Background: Osteoporotic fractures are a major health problem among postmenopausal women. A significant proportion of subjects with low bone density are currently undiagnosed. Peripheral devices can be used for osteoporosis diagnosis, but their role in long-term monitoring of skeletal changes is unclear. The current study evaluated the ability of quantitative ultrasound (QUS) measurements to follow osteoporotic subjects treated with alendronate. Methods: QUS measurements were done with Sunlight Omnisense(TM) (Omnisense, Sunlight Medical Ltd., Tel Aviv, Israel), which determines the bone speed of sound (SOS) in several skeletal sites. Postmenopausal women with T-scores of -2 or less at one site were recruited and treated with alendronate for at least 1 yr. Follow-up was done with QUS and dual-energy X-ray absorptiometry (DXA) (Lunar DPX scanner, Madison, WI, USA) measurements. Results: After 12 mo, bone mineral density (BMD) increased significantly at the lumbar spine (LS) (0.34 +/- 0.08 T-score, p = 0.0001 with 95% CI [0.19, 0.49]) and QUS at the tibia (TIB) (0.21 +/- 0.09 T-score, p = 0.02 with 95% CI [0.03, 0.39]). After 12 mo, a significant increase in mean T-scores was demonstrated in all sites assessed according to baseline T-score of -2 or less. Conclusions: Peripheral QUS measurement may be considered for follow-up on skeletal changes in response to alendronate treatment.

Wennrich, L., P. Popp and C. Hafner (2002). "Novel integrative passive samplers for the long-term monitoring of semivolatile organic air pollutants." *Journal of Environmental Monitoring* **4**(3): 371-376.<Go to ISI>://000176397000006

Two types of passive sampler were developed for the long-term monitoring of semivolatile organic compounds (SOCs) in air. They consist of poly(dimethylsiloxane) (PDMS)-coated stir bars (type A) or silicone tubing (type B), acting as a solid receiving medium, enclosed in a heat-sealed low-density polyethylene (LDPE) membrane. These samplers combine the advantages of integrative passive sampling with those of analysing accumulated analytes by thermodesorption-GC-MS, whilst avoiding the use of solvents and expensive sample preparation and cleanup steps. The performance of these samplers was investigated for the integrative sampling of SOC, including alpha- and gamma-hexachlorocyclohexanes, hexachlorobenzene, 2,4,4'-trichlorobiphenyl, 2,2',5,5'- tetrachlorobiphenyl and fluoranthene, in laboratory exposure experiments under controlled conditions. For both types of sampler, the uptake of all the analytes investigated was linear over an exposure period of 15 days. The sampling rates calculated ranged from 70 to 320 ml h⁻¹ (sampler A) and 630 to 4300 ml h⁻¹ (sampler B). The passive samplers are able to detect low time-weighted average air concentrations in the pg m⁻³ range. The small, robust and inexpensive sampling devices were tested successfully for the long-term air monitoring of semivolatile organic pollutants in a polluted area over an exposure period of up to 28 days..

Wenzel, U., H. Vijgen and W. Ullrich (2003). "On-line monitoring of a frontal chromatographic separation using inductively coupled plasma atomic emission spectroscopy." *Analytical and Bioanalytical Chemistry* **377**(1): 48-57.<Go to ISI>://000185423200008

A test array is described employing a destructive analytical technique for the long-term monitoring of an industrial-scale separation process. As an example, we chose frontal chromatography as the separation and ICP/AES as the analytical method. The feed solution of the process was conveyed by a process pump via the separation unit to a sample station,

where a small portion was diverted and transported by a roller pump into the spectrometer. We equipped our array with different loops for operating the process, calibrating the instrument and verifying the calibration. We obtained identical results for the different loops by absorbing the pulsation of the process pump and arranging for identical suction lines of the spectrometer pump. Based on the results, we redesigned the sample station for a technical application using only commercially available parts.

Wetzel, M. A., G. E. Shaw, J. R. Slusser, R. D. Borys and C. F. Cahill (2003). "Physical, chemical, and ultraviolet radiative characteristics of aerosol in central Alaska." *Journal of Geophysical Research-Atmospheres* **108**(D14): art. no.-4418.<Go to ISI>://000184611500002

[1] A new long-term monitoring site for providing multiwavelength (ultraviolet through near-infrared) and broadband irradiances has been established at the Poker Flat Research Range, Alaska, in order to assess the impacts of ozone, cloud cover, surface albedo, and aerosol conditions on trends in ultraviolet (UV) radiation reaching the surface. Targeted field measurements were conducted in the first year of site operation to characterize the properties of aerosols commonly found in the study region. Chemical analysis was used to match aerosol composition to aerosol size distributions and spectral aerosol optical depth (AOD). Results are reported on four air mass types: three springtime examples, including an Asian air mass with Gobi Desert dust, aged industrial pollution from the Arctic, and humid marine air, and a comparative case in late summer. Aerosol imported to central Alaska from extraregional sources produced small to moderate increases in UV optical depth calculated from direct-beam spectral extinction and a limited reduction in transmittance at UV wavelengths. Marine aerosol in a high-humidity environment produced the largest impact on UV extinction. The Angstrom coefficients and single scattering albedos calculated from the spectral AOD and irradiances and the spectral characteristics of size-specific aerosol absorption measurements showed distinct differences between the aerosol source types, suggesting that even in cases of low aerosol concentration, air mass characteristics influence the spectral and angular distributions of UV radiation that are important for modeling photochemical processes and biological exposure.

Wick, M. and B. Freier (2000). "Long-term effects of an insecticide application on non-target arthropods in winter wheat - a field study over 2 seasons." *Anzeiger Fur Schadlingskunde-Journal of Pest Science* **73**(3): 61-69.<Go to ISI>://000087756700001

The effects of the insecticide lambda-cyhalothrin (Karate) on non-target arthropods in winter wheat were studied throughout two successive seasons in 1998 and 1999. The study particularly focussed on the crop in the growing season after insecticide application (also winter wheat) for detection of potential long-term effects and for determination of the suitability of different sampling methods. The investigations were based on the assumption that arthropod immigration from surrounding areas is limited in large fields. For this reason a simple approach seemed to be feasible. Two plots of equal size (10 ha, adjusted to each other) were defined in a 100ha field and designated control and treatment plots. Ten sampling points were established on each plot. The following monitoring methods were utilised: visual counting, sweep netting and pitfall trapping. In the first year of investigation, countings and catches were carried out 2 days prior to insecticide application and 2, 16, 30 and 44 days after application. In the next year, they were carried out 365 days and 384 days after insecticide application in the successive crop of winter wheat. At the time of the first sampling prior to insecticide application, the two plots showed significant differences with respect to arthropod density or activity, particularly in visual counting and to a minor degree to sweep netting and pitfall trapping. Lower densities or activities were observed in the plot reserved for treatment. Measures for mathematical equalisation of the results of population densities before pesticide treatment should be considered. After insecticide application, the densities or activities of non-target arthropods decreased, particularly in visual counting and sweep netting. After one year, these effects disappeared to a large extent. Several groups of arthropods reached even higher levels in the treated plot than in the untreated one. The pitfall traps revealed weak activity-decreasing effects in carabids and spiders in the treated plot, but the opposite tendency for staphylinids. Hence, it seems that the conditions in a large field are less homogeneous, and that smaller scale conditions can support processes of recovery in non-target populations.

Wiggins, S. (2003). "Autonomous acoustic recording packages (ARPs) for long-term monitoring of whale sounds." *Marine Technology Society Journal* **37**(2): 13-22.<Go to ISI>://000185196900002

Advancements in low-power and high-data capacity computer technology during the past decade have been adapted to autonomously record acoustic data from vocalizing whales over long time periods. Acoustic monitoring of whales has advantages over traditional visual surveys including greater detection ranges, continuous long-term monitoring in remote locations and in various weather conditions, and lower cost. An autonomous acoustic recording package (ARP) is described that uses a tethered hydrophone above a seafloor-mounted instrument frame. ARPs have been deployed to record baleen whale sounds in the Bering Sea, off the coast of southern California, near the West Antarctic Peninsula, and near Hawaii. ARP data have provided new information on the seasonal presence, abundance, call character, and patterns of vocalizing whales. Current development is underway for a broader-band, higher-data capacity system capable of recording odontocete whales, dolphins, and porpoises for long time periods.

Wise, K. D., D. J. Anderson, J. F. Hetke, D. R. Kipke and K. Najafi (2004). "Wireless implantable microsystems: High-density electronic interfaces to the nervous system." *Proceedings of the IEEE* **92**(1): 76-97.<Go to ISI>://000187999200006

This paper describes the development of a high-density electronic interface to the central nervous system. Silicon micromachined electrode arrays now permit the long-term monitoring of neural activity in vivo as well as the insertion of electronic signals into neural networks at the cellular level. Efforts to understand and engineer the biology of the implant/tissue interface are also underway. These electrode arrays are facilitating, significant advances in our understanding of the nervous system, and merged with on-chip circuitry, signal processing, microfluidics, and wireless interfaces, they are forming the basis for a family of neural prostheses for the possible treatment of disorders such as blindness, deafness, paralysis, severe epilepsy, and Parkinson's disease.

Wyrzykowski, L., A. Udalski, P. L. Schechter, O. Szcwyczyk, M. Szymanski, M. Kubiak, G. Pietrzynski, I. Soszynski and K. Zebrun (2003). "The optical gravitational lensing experiment. Optical monitoring of the gravitationally lensed quasar HE1104-1805 in 1997-2002." *Acta Astronomica* **53**(3): 229-240.<Go to ISI>://000186237900002

We present results of the long term monitoring of the gravitationally lensed quasar HE1104-1805. The photometric data were collected between August 1997 and January 2002 as a subproject of the OGLE survey. We determine the time delay in the light curves of images A and B of HE1104-1805 to be equal to 157 +/- 21 days with the variability in the image B lag curve leading variability of the image A. The result is in excellent agreement with the earlier determination by Ofek and Maoz. OGLE photometry of HE1104-1805 is available to the astronomical community from the OGLE Internet archive.

Yang, J. W., H. J. Cho, S. H. Lee and J. Y. Lee (2004). "Characterization of SnO₂ ceramic gas sensor for exhaust gas monitoring of SVE process." *Environmental Monitoring and Assessment* **92**(1-3): 153-161.<Go to ISI>://000188709000011

A Figaro-type gas sensor system was investigated for the monitoring of volatile organic contaminants (VOC) in the exhaust gas from a soil vapor extraction (SVE) process. Benzene, toluene, ethyl benzene and xylene (BTEX), and their mixtures, were tested as representative contaminants. Reasonably good correlation factors > 0.98 were obtained between the GC analyses and the sensor responses for each component, and for the total gas concentrations. Although the composition of the exhaust gas from SVE process, as well as the amount of each component, change with time, the sensor can be used to estimate the residual amount of contaminants by measuring the total concentrations in the exhaust gas. The sensor can be utilized as a valuable tool for the monitoring of SVE process by indicating when the operation to remediate a contaminated site should be stopped. The proposed ceramic gas sensor system may be a good alternative to existing methods, because it can satisfy the essential monitoring necessities of SVE processes, and has many advantages over other fully equipped instrumentation, as a cost-effective device, with long-term monitoring stability.

Yildirim, H., M. E. Ozel, R. Radberger and A. Akca (2002). "Long term monitoring of land use changes of means of remote sensing and GIS." *Allgemeine Forst Und Jagdzeitung* **173**(1): 15-19.<Go to ISI>://000173762100003

The use of remote sensing techniques and subsequent analysis by means of a GIS offer possibilities for the area-wide monitoring of landscape changes. To exemplify the effectiveness of such methods against the background of global urbanization and its threat to natural resources, the article shows the results of a study at the location of Gebze, an industrial town within the Istanbul metropolitan area. It can be seen that, for the study periods from 1986 till 1993 and from 1993 till 1998, a dramatic industrialization and urbanization has taken place. mainly during the first period. While the portion of built-up areas was only 30% in 1986, it increased to 49% in 1993 and nearly 55% in 1998 (Tab. 1). Most of the built-up areas were drawn from land previously used for pasture and other agricultural activities (Fig. 1 and 2). The fact that the land use plan, issued in 1986 by the provincial government, was practically ignored by the actual development has to be taken very seriously (Tab. 3). Concerning this problem, the combined use of remote sensing and GIS appears to be necessary to provide authorities with up-to-date and spatially explicit information. Thus, reasonable and better control of land use changes can be facilitated.

Zabranska, J., M. Dohanyos, P. Jenicek, H. Ruzickova and A. Vranova (2003). "Efficiency of autothermal thermophilic aerobic digestion and thermophilic anaerobic digestion of municipal wastewater sludge in removing Salmonella spp. and indicator bacteria." *Water Science and Technology* **47**(3): 151-156.<Go to ISI>://000181785000026

The study is focused on the comparison of autothermal thermophilic aerobic digestion, thermophilic and mesophilic anaerobic digestion, based on long term monitoring of all processes in full-scale wastewater treatment plants, with an emphasis on the efficiency in destroying pathogens. The hygienisation effect was evaluated as a removal of counts of indicator bacteria, thermotolerant coliforms and enterococci as CFU/g total sludge solids and a frequency of a positive Salmonella spp. detection. Both thermophilic technologies of municipal wastewater sludge stabilisation had the capability of producing sludge A biosolids suitable for agricultural land application when all operational parameters (mainly temperature, mixing and retention time) were stable and maintained at an appropriate level.

Zadoks, J. C. (1995). *An Epidemiological View on the Introduction of GMOs at the Third Trophic Level*. Pan-European conference on the potential long-term ecological impact of genetically modified organisms, Strasbourg, Council of Europe Press, pp 165-175

Zapata, F. (2003). "The use of environmental radionuclides as tracers in soil erosion and sedimentation investigations: recent advances and future developments." *Soil & Tillage Research* **69**(1-2): 3-13.<Go to ISI>://000181159100002

Although much of the recent attention on the environmental problems has focused on climatic change, there is also increasing concern that accelerated soil erosion and associated land degradation represent a major problem for sustainable development and environmental protection. There is an urgent need to obtain reliable quantitative data on the extent and rates of soil erosion worldwide to provide a more comprehensive assessment of the magnitude of the problems and to underpin the selection of effective soil conservation measures. The use of environmental radionuclides, in particular Cs-137, affords an effective and valuable means for studying erosion and deposition within the landscape. The key advantage of this approach is that it can provide retrospective information on medium-term (30-40 years) erosion/deposition rates and spatial patterns of soil redistribution, without the need for long-term monitoring programmes. Advantages and limitations of the technique are highlighted. The launching of two closely linked International Atomic Energy Agency (IAEA) research networked projects in 1996 involving some 25 research groups worldwide has made a major contribution to co-ordinating efforts to refine and to standardise the Cs-137 technique. The efficacy and value of the approach has been demonstrated by investigations in a number of environments. Significant developments that have been made to exploit its application in a wide range of studies are reported in this review paper. Other environmental radionuclides, such as unsupported Pb-210 and Be-7 offer considerable potential for use in soil erosion investigations, both individually and complementary to Cs-137. The IAEA through research networks and other mechanisms is promoting further development and applications of these radionuclides in soil erosion and sedimentation studies for a sustainable resource use and environmental protection. (C) 2002 Elsevier Science B.V. All rights reserved.

Zhang, Y., J. E. Coleman, G. E. Fuchs and S. L. Semple-Rowland (2003). "Circadian oscillator function in embryonic retina and retinal explant cultures." *Molecular Brain Research* **114**(1): 9-19.<Go to ISI>://000183665100002

Retinal circadian oscillators regulate many aspects of retinal function. Investigations of these oscillators and the biochemical cascades that entrain them would be greatly facilitated if experimental paradigms could be identified that permit long-term monitoring of retinal circadian oscillator function in vitro. The purpose of this study was to determine if

chicken retinas maintained in explant culture conditions could serve in this capacity. Retinal circadian oscillator function was studied by monitoring iodopsin transcription under cyclic light, constant dark, and following reversal of the light cycle. Rhythms observed in the explant cultures were compared to those observed in retinas of embryos (in ovo) and post-hatch chickens. Robust iodopsin transcript rhythms were observed for up to 9 days in explant cultures maintained under cyclic light. These rhythms persisted for 48 h in constant darkness and the time course for re-entrainment of the rhythm to a reversed light/dark cycle was similar to that observed in post-hatch chicken retinas. These results show that circadian oscillators located within the retina play a key role in the regulation of iodopsin transcription in retinal explant cultures and in retinas of post-hatch chickens. Interestingly, our data show that iodopsin transcription in retinas of intact embryos is primarily, if not entirely, driven by light. These results show that the circadian oscillators driving iodopsin transcription in embryonic retinal explant cultures exhibit functional characteristics similar to those found in post-hatch chicken retina, supporting use of this paradigm in further studies of entrainment of these oscillators in retina. (C) 2003 Elsevier Science B.V. All rights reserved.

Zhou, W. F., B. F. Beck and T. S. Green (2003). "Evaluation of a peat filtration system for treating highway runoff in a karst setting." *Environmental Geology* **44**(2): 187-202. <Go to ISI>://000183872900008

The deleterious character of highway runoff, especially following long periods without precipitation, has been well documented in the literature. It transports hydrocarbons, heavy metals, and other contaminants from highways, contributing to the pollution of surface water and groundwater. Groundwater is particularly vulnerable in karst areas where highway runoff is transferred quickly into subsurface conduit networks through open sinkholes and/or sinking streams. The difficulties in remediating contaminated karst aquifers make it crucial for karst aquifers to receive only uncontaminated water. A peat filtration system was constructed at the I-40/I-640 interchange in eastern Knoxville, Tennessee, USA, to remove highway runoff contaminants prior to being transported into karst aquifers. Recent field tests indicate that the system can significantly decrease the concentrations of analyzed constituents including PAHs (polyaromatic hydrocarbons), popper, and zinc. However, the removal efficiency depends on the concentration of the contaminants in the runoff. Long-term monitoring is required to determine the true effectiveness of the designed filtration system and its reliability.

Ziehl, P. H., J. E. Cloyd and M. E. Kreger (2004). "Investigation of minimum longitudinal reinforcement requirements for concrete columns using present-day construction materials." *Ac Structural Journal* **101**(2): 165-175. <Go to ISI>://000189315700002

A research project was conducted to assess the feasibility of reducing the current ACI Building Code and AASHTO Bridge Specification requirements for minimum longitudinal reinforcing steel in columns. The current code requirement is based primarily on research conducted in the 1920s and 1930s on concrete with a compressive strength generally less than 34.5 MPa (5000 psi). The investigation was conducted to determine the effects of present-day construction materials on minimum reinforcement requirements. A research program was carried out that included: 1) fabrication and long-term loading and monitoring of 24, 8-in. diameter by 4-ft long reinforced concrete column specimens; 2) fabrication of reduced-humidity enclosures for storage of all specimens throughout the test program; and 3) long-term monitoring of 14 unloaded companion specimens. Test variables included concrete strength and reinforcement ratio. All loaded specimens were subjected to a nominal compressive force of $0.40f_c/A_g$. The long-term response of concentrically loaded and unloaded specimens is presented in this paper, and measured responses are compared with predicted long-term responses based on recommendations from ACI Committee 209.

Zweifel, C. and R. Stephan (2003). "Microbiological monitoring of carcasses within the scope of self-control - Information content und expressiveness of different evaluation forms." *Fleischwirtschaft* **83**(12): 88-92. <Go to ISI>://000187362700013

The data on microbiological status (total colony count) of sheep carcasses (n = 310) were used as the basis for different evaluation forms and were compared with the directives of the EU-decision 2001/471/EG. Results of each carcass should be shown in a form easy to understand, e.g. a bar chart. Quality control charts offer a biometric-founded concept for drawing a graph of average \log_{10} values of each sampling day. However, average values do not recognize localized contamination on carcasses and therefore do not allow reliable conclusions with regard to abattoir-specific weak points in slaughter hygiene. Therefore, with results out of limits and periodically, additional examinations separated for the different sampling sites, with results shown e.g. as box plots, should be planned. The evaluations demanded by the EU-decision (pooling the samples of each carcass, continuous documentation of average values and categorizing these values as acceptable, critical or not acceptable) are appropriate for a long-term monitoring of slaughter hygiene in an abattoir. However, because the results of microbiological examinations are abattoir-specific, "limit values" can only form a "baseline".