บทความที่น่าสนใจประจำเดือนเมษายน 2558

สาขาวิทยาศาสตร์และเทคโนโลยี

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Title:	Climate change and dead zones
Author:	Andrew H. Altieri and Keryn B. Gedan
Journal:	Global Change Biology, Volume 21, Issue 4, pages 1395–1406, April 2015
Abstract:	Estuaries and coastal seas provide valuable ecosystem services but are particularly vulnerable to the co-occurring threats of climate change and oxygen-depleted dead zones. We analyzed the severity of climate change predicted for existing dead zones, and found that 94% of dead zones are in regions that will experience at least a 2 °C temperature increase by the end of the century. We then reviewed how climate change will exacerbate hypoxic conditions through oceanographic, ecological, and physiological processes. We found evidence that suggests numerous climate variables including temperature, ocean acidification, sea-level rise, precipitation, wind, and storm patterns will affect dead zones, and that each of those factors has the potential to act through multiple pathways on both oxygen availability and ecological responses to hypoxia. Given the variety and strength of the mechanisms by which climate change exacerbates hypoxia, and the rates at which climate is changing, we posit that climate change variables are contributing to the dead zone epidemic by acting synergistically with one another and with recognized anthropogenic triggers of hypoxia including eutrophication. This suggests that a multidisciplinary, integrated approach that considers the full range of climate variables is needed to track and potentially reverse the spread of dead zones.
Database:	Wiley Online Library

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Title:	Intercropping enhances soil carbon and nitrogen
Author:	Wen-Feng Cong, Ellis Hoffland, Long Li, Johan Six, Jian-Hao Sun, Xing-Guo Bao, Fu-Suo Zhang and Wopke Van Der Werf
Journal:	Global Change Biology, Volume 21, Issue 4, pages 1715–1726, April 2015
Abstract:	Intercropping, the simultaneous cultivation of multiple crop species in a single field, increases aboveground productivity due to species complementarity. We hypothesized that intercrops may have greater belowground productivity than sole crops, and sequester more soil carbon over time due to greater input of root litter. Here, we demonstrate a divergence in soil organic carbon (C) and nitrogen (N) content over 7 years in a field experiment that compared rotational strip intercrop systems and ordinary crop rotations. Soil organic C content in the top 20 cm was 4% ± 1% greater in intercrops than

	in sole crops, indicating a difference in C sequestration rate between intercrop and sole crop systems of 184 ± 86 kg C ha−1 yr−1. Soil organic N content in the top 20 cm was 11% ± 1% greater in intercrops than in sole crops, indicating a difference in N sequestration rate between intercrop and sole crop systems of 45 ± 10 kg N ha−1 yr−1. Total root biomass in intercrops was on average 23% greater than the average root biomass in sole crops, providing a possible mechanism for the observed divergence in soil C sequestration between sole crop and intercrop systems. A lowering of the soil δ15N signature suggested that increased biological N fixation and/or reduced gaseous N losses contributed to the increases in soil N in intercrop rotations with faba bean. Increases in soil N in wheat/maize intercrop pointed to contributions from a broader suite of mechanisms for N retention, e.g., complementary N uptake strategies of the intercropped plant species. Our results indicate that soil C sequestration potential of strip intercropping is similar in magnitude to that of currently recommended management practises to conserve organic matter in soil. Intercropping can contribute to multiple agroecosystem services by increased yield, better soil quality and soil C sequestration.
Database:	Wiley Online Library

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Title:	Impacts of altered precipitation regimes on soil communities and biogeochemistry in arid and semi-arid ecosystems
Author:	Uffe N. Nielsen and Becky A. Ball
Journal:	Global Change Biology, Volume 21, Issue 4, pages 1407–1421, April 2015
Abstract:	Altered precipitation patterns resulting from climate change will have particularly significant consequences in water-limited ecosystems, such as arid to semi-arid ecosystems, where discontinuous inputs of water control biological processes. Given that these ecosystems cover more than a third of Earth's terrestrial surface, it is important to understand how they respond to such alterations. Altered water availability may impact both aboveground and belowground communities and the interactions between these, with potential impacts on ecosystem functioning; however, most studies to date have focused exclusively on vegetation responses to altered precipitation regimes. To synthesize our understanding of potential climate change impacts on dryland ecosystems, we present here a review of current literature that reports the effects of precipitation events and altered precipitation regimes on belowground biota and biogeochemical cycling. Increased precipitation generally increases microbial biomass and fungal:bacterial ratio. Few studies report responses to reduced precipitation but the effects likely counter those of increased precipitation. Altered precipitation regimes have also been found to alter microbial community composition but broader

	generalizations are difficult to make. Changes in event size and frequency influences invertebrate activity and density with cascading impacts on the soil food web, which will likely impact carbon and nutrient pools. The long-term implications for biogeochemical cycling are inconclusive but several studies suggest that increased aridity may cause decoupling of carbon and nutrient cycling. We propose a new conceptual framework that incorporates hierarchical biotic responses to individual precipitation events more explicitly, including moderation of microbial activity and biomass by invertebrate grazing, and use this framework to make some predictions on impacts of altered precipitation regimes in terms of event size and frequency as well as mean annual precipitation. While our understanding of dryland ecosystems is improving, there is still a great need for longer term in situ manipulations of precipitation regime to test our model.
Database:	Wiley Online Library

4	Title:	Polarized frames on “climate change” and “global warming” across countries and states: Evidence from Twitter big data
	Author:	S. Mo Jang, P. Sol Hart
	Journal:	Global Environmental Change, Volume 32, May 2015, Pages 11–17
	Abstract:	Environmental communication researchers have focused on the role of media frames in the formation of public opinion. Yet, little is known about how citizens incorporate such frames into everyday conversations. We address this issue by examining the stream of Twitter conversations about climate change over two years. We demonstrate that hoax frames that question the reality of climate change prevail in the US, particularly in “red states” compared to the UK, Canada, and Australia or “blue states” in the US. We also investigate the use of terms, “global warming” and “climate change.” We find that red states prefer “global warming” to “climate change” compared to blue states and “global warming” is particularly associated with hoax frames.
	Database:	ScienceDirect

5	Title:	Increasing information usability for climate adaptation: The role of knowledge networks and communities of practice
	Author:	Scott E. Kalafatis, Maria Carmen Lemos, Yun-Jia Lo, Kenneth A. Frank
	Journal:	Global Environmental Change, Volume 32, May 2015, Pages 30–39
	Abstract:	This paper examines the dissemination of climate knowledge among Great Lakes decision-makers, especially focusing on cross-scale processes to tailor knowledge to better fit decision contexts. It employs both network analysis of those involved with documents and events intended to integrate

	climate change information into policy production or practice and qualitative research to understand how climate information flows among stakeholders in the water quality sector, a policy area of great importance in the Great Lakes region. It finds that the network consists of centralized regional-scale work surrounded by more dispersed specialized and local work that has developed over time. Our interviews reveal that overlaps between these scales produce more usable knowledge as potential users form their own specialized networks which operate as communities of practice that further tailor information to match particular application needs. We propose a model of this process that describes how the development of usable information works in a continuum, with each step furthering usability at the regional level. This model outlines the potential for knowledge networks and communities of practice to not only drive the use of information in particular decision contexts, but also provide a critical means to inform regional work and scale up the production of usable information about climate change.
Database:	ScienceDirect

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Title:	How environmental conditions impact mosquito ecology and Japanese encephalitis: An eco-epidemiological approach
Author:	Huai-Yu Tian, Peng Bi, Bernard Cazelles, Sen Zhou, Shan-Qian Huang, Jing Yang, Yao Pei, Xiao-Xu Wu, Shi-Hong Fu, Shi-Lu Tong, Huan-Yu Wang, Bing Xu
Journal:	Environment International, Volume 79, June 2015, Pages 17–24
Abstract:	Japanese encephalitis (JE) is one of the major vector-borne diseases in Southeast Asia and the Western Pacific region, posing a threat to human health. In rural and suburban areas, traditional rice farming and intensive pig breeding provide an ideal environment for both mosquito development and the transmission of JEV among human beings. Combining surveillance data for mosquito vectors, human JE cases, and environmental conditions in Changsha, China, 2004–2009, generalized threshold models were constructed to project the mosquito and JE dynamics. Temperature and rainfall were found to be closely associated with mosquito density at 1, and 4 month lag, respectively. The two thresholds, maximum temperature of 22–23 °C for mosquito development and minimum temperature of 25–26 °C for JEV transmission, play key roles in the ecology of JEV. The model predicts that, in the upper regime, a 1 g/m3 increase in absolute humidity would on average increase human cases by 68–84%. A shift in mosquito species composition in 2007 was observed, and possibly caused by a drought. Effective predictive models could be used in risk management to provide early warnings for potential JE transmission.
Database:	ScienceDirect

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Title:	Exploring the planetary boundary for chemical pollution
Author:	Miriam L. Diamond, Cynthia A. de Wit, Sverker Molander, Martin Scheringer, Thomas Backhaus, Rainer Lohmann, Rickard Arvidsson, Åke Bergman, Michael Hauschild, Ivan Holoubek, Linn Persson, Noriyuki Suzuki, Marco Vighi, Cornelius Zetzsch
Journal:	Environment International, Volume 78, May 2015, Pages 8–15
Abstract:	Rockström et al. (2009a, 2009b) have warned that humanity must reduce anthropogenic impacts defined by nine planetary boundaries if “unacceptable global change” is to be avoided. Chemical pollution was identified as one of those boundaries for which continued impacts could erode the resilience of ecosystems and humanity. The central concept of the planetary boundary (or boundaries) for chemical pollution (PBCP or PBCPs) is that the Earth has a finite assimilative capacity for chemical pollution, which includes persistent, as well as readily degradable chemicals released at local to regional scales, which in aggregate threaten ecosystem and human viability. The PBCP allows humanity to explicitly address the increasingly global aspects of chemical pollution throughout a chemical's life cycle and the need for a global response of internationally coordinated control measures. We submit that sufficient evidence shows stresses on ecosystem and human health at local to global scales, suggesting that conditions are transgressing the safe operating space delimited by a PBCP. As such, current local to global pollution control measures are insufficient. However, while the PBCP is an important conceptual step forward, at this point single or multiple PBCPs are challenging to operationalize due to the extremely large number of commercial chemicals or mixtures of chemicals that cause myriad adverse effects to innumerable species and ecosystems, and the complex linkages between emissions, environmental concentrations, exposures and adverse effects. As well, the normative nature of a PBCP presents challenges of negotiating pollution limits amongst societal groups with differing viewpoints. Thus, a combination of approaches is recommended as follows: develop indicators of chemical pollution, for both control and response variables, that will aid in quantifying a PBCP(s) and gauging progress towards reducing chemical pollution; develop new technologies and technical and social approaches to mitigate global chemical pollution that emphasize a preventative approach; coordinate pollution control and sustainability efforts; and facilitate implementation of multiple (and potentially decentralized) control efforts involving scientists, civil society, government, non-governmental organizations and international bodies.
Database:	ScienceDirect

8	Title:	Review of nanomaterial aging and transformations through the life cycle of nano-enhanced products
	Author:	Denise M. Mitrano, Sylvie Motellier, Simon Clavaguera, Bernd Nowack
	Journal:	Environment International, Volume 77, April 2015, Pages 132–147
	Abstract:	In the context of assessing potential risks of engineered nanoparticles (ENPs), life cycle thinking can represent a holistic view on the impacts of ENPs through the entire value chain of nano-enhanced products from production, through use, and finally to disposal. Exposure to ENPs in consumer or environmental settings may either be to the original, pristine ENPs, or more likely, to ENPs that have been incorporated into products, released, aged and transformed. Here, key product-use related aging and transformation processes affecting ENPs are reviewed. The focus is on processes resulting in ENP release and on the transformation(s) the released particles undergo in the use and disposal phases of its product life cycle for several nanomaterials (Ag, ZnO, TiO2, carbon nanotubes, CeO2, SiO2 etc.). These include photochemical transformations, oxidation and reduction, dissolution, precipitation, adsorption and desorption, combustion, abrasion and biotransformation, among other biogeochemical processes. To date, few studies have tried to establish what changes the ENPs undergo when they are incorporated into, and released from, products. As a result there is major uncertainty as to the state of many ENPs following their release because much of current testing on pristine ENPs may not be fully relevant for risk assessment purposes. The goal of this present review is therefore to use knowledge on the life cycle of nano-products to derive possible transformations common ENPs in nano-products may undergo based on how these products will be used by the consumer and eventually discarded. By determining specific gaps in knowledge of the ENP transformation process, this approach should prove useful in narrowing the number of physical experiments that need to be conducted and illuminate where more focused effort can be placed.
	Database:	ScienceDirect

9	Title:	Photochemical Transformation of Graphene Oxide in Sunlight
	Author:	Wen-Che Hou, Indranil Chowdhury, David G. Goodwin, Jr., W. Matthew Henderson, D. Howard Fairbrother, Dermont Bouchard, and Richard G. Zepp
	Journal:	Environmental Science & Technology, March 17, 2015, Volume 49, Issue 6, Pages 3263-3986
	Abstract:	Graphene oxide (GO) is promising in scalable production and has useful properties that include semiconducting behavior, catalytic reactivity, and aqueous dispersibility. In this study, we investigated the photochemical fate of GO under environmentally relevant sunlight conditions. The results indicate that GO readily photoreacts under simulated sunlight with the potential involvement of electron–hole pair creation. GO was shown to photodisproportionate to CO2, reduced materials similar to reduced

	GO (rGO) that are fragmented compared to the starting material, and low molecular-weight (LMW) species. Kinetic studies show that the rate of the initially rapid photoreaction of GO is insensitive to the dissolved oxygen content. In contrast, at longer time points (>10 h), the presence of dissolved oxygen led to a greater production of CO2 than the same GO material under N2-saturated conditions. Regardless, the rGO species themselves persist after extended irradiation equivalent to 2 months in natural sunlight, even in the presence of dissolved oxygen. Overall, our findings indicate that GO phototransforms rapidly under sunlight exposure, resulting in chemically reduced and persistent photoproducts that are likely to exhibit transport and toxic properties unique from parent GO.
Database:	American Chemical Society Journal (ACS)

10	Title:	Colorimetric Detection of Catalytic Reactivity of Nanoparticles in Complex Matrices
	Author:	Charlie Corredor, Mark D. Borysiak, Jay Wolfer, Paul Westerhoff, and Jonathan D. Posner
	Journal:	Environmental Science & Technology, March 17, 2015, Volume 49, Issue 6, Pages 3611–3618
	Abstract:	There is a need for new methodologies to quickly assess the presence and reactivity of nanoparticles (NPs) in commercial, environmental, and biological samples since current detection techniques require expensive and complex analytical instrumentation. Here, we investigate a simple and portable colorimetric detection assay that assesses the surface reactivity of NPs, which can be used to detect the presence of NPs, in complex matrices (e.g., environmental waters, serum, urine, and in dissolved organic matter) at as low as part per billion (ppb) or ng/mL concentration levels. Surface redox reactivity is a key emerging property related to potential toxicity of NPs with living cells, and is used in our assays as a key surrogate for the presence of NPs and a first tier analytical strategy toward assessing NP exposures. We detect a wide range of metal (e.g., Ag and Au) and oxide (e.g., CeO2, SiO2, VO2) NPs with a diameter range of 5 to 400 nm and multiple capping agents (tannic acid (TA), polyvinylpyrrolidone (PVP), branched polyethylenimine (BPEI), polyethylene glycol (PEG)). This method is sufficiently sensitive (ppb levels) to measure concentrations typically used in toxicological studies, and uses inexpensive, commercially available reagents.
	Database:	American Chemical Society Journal (ACS)