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Introduction:

There are 3 main elements in the Science Newsletter is composed. In the first part, we provide articles about central issues for each discipline in this university, and they are provided with one subject for a time. In the second part, we select articles from the top journals in the whole science research. In the third part, we post information about calling papers for international conferences. Hopefully, some of the information in this manuscript may be useful for those who are dedicating to scientific career. Besides, the journals are also posted on the website of our library, and they are available to be accessed any time at http://lib.jsut.edu.cn/2018/1015/c5474a113860/page.htm. If there are any questions or suggestions, please send e-mails to 289595883@qq.com in no hesitate.

Ⅰ Topics

The key word of this month is **Environmental Sciences.** We list several articles which are related to the top concerned topics of computer science researches. The articles are classified in 5 categories, and they are: **Waste Management and Disposal, Ecological Modelling, Health, Toxicology and Mutagenesis and Ecology and Water Science and Technology**. Also, the listed articles are all arranged in a descending sort of impact factor in order to make it convenient to read. There are also links to both official site and full text for each article.

WASTE MANAGEMENT AND DISPOSAL

The Science of The Total Environment (impact factor: 9.82) 1 区

MXenes as emerging nanomaterials in water purification and environmental remediation

ShujunYu, HaoTang, DiZhang，et.al

Abstract:

Environmental pollution has accelerated and intensified because of the acceleration of industrialization, therefore fabricating excellent materials to remove hazardous pollutants has become inevitable. MXenes as emerging transition metal nitrides, carbides or carbonitrides with high conductivity, hydrophilicity, excellent structural

stability, and versatile surface chemistry, become ideal candidates for water purification and environmental remediation. Particularly, MXenes reveal excellent sorption capability and efficient reduction performance for various contaminants of wastewater. In this regard, a comprehensive understanding of the removal behaviors of MXene-based nanomaterials is necessary to explain how they remove various pollutants in water. The eliminate process of MXene-based nanomaterials is collectively influenced by the physicochemical properties of the materials themselves and the chemical properties of different contaminants. Therefore, in this review paper, the synthesis strategies and properties of MXene-based nanomaterials are briefly introduced. Then, the chemical properties, removal behaviors and interaction mechanisms of heavy metal ions, radionuclides, and organic pollutants by MXene-based nanomaterials are highlighted. The overview also emphasizes associated toxicity, secondary contamination, the challenges, and prospects of the MXene-based nanomaterials in the applications of water treatment. This review can supply valuable ideas for fabricating versatile MXene nanomaterials in eliminating water pollution.

Journal of Hazardous Materials (impact factor: 13.61) 1 ☒

Piezoelectric polarization promoted spatial separation of photoexcited electrons and holes in two-dimensional g-C3N4 nanosheets for efficient elimination of chlorophenols

HuaLei · QingshenHe · MeixuanWu et.al

Abstract:

Graphitic carbon nitride (g-C3N4) has been proved to be a potential photocatalyst for environment purification, but the high recombination rate of photogenerated carriers leads to the low photocatalytic efficiency. Herein, we report the enhanced degradation of chlorophenols by 2D ultrathin g-C3N4 nanosheets with intrinsic piezoelectricity through photopiezocatalysis strategy. Under the simultaneous visible-light irradiation and ultrasonic vibration, the 2D g-C3N4 presented improved removal efficiency for elimination of 2,4-dichlorophenol (2,4-DCP) with an apparent rate constant of $6.65 \times 10{-}2$ min−1, which was 6.7 and 2.2 times of the photocatalysis and piezocatalysis, respectively. The improved removal efficiency was attributed to the sufficient separation of free charges driven by the ultrasound-induced piezoelectric field in the 2D g-C3N4, which was demonstrated by the enhanced current response under photopiezocatalysis mode. Additionally, the photopiezocatalysis of 2D g-C3N4 was proved to possess well universality for removing different chlorophenols, as well as high durability and dechlorination efficiency. Finally, a possible photopiezocatalytic mechanism for removal of 2,4-DCP was proposed based on the electron paramagnetic resonance (EPR) technique and the determination of intermediates through liquid chromatography-mass spectrometry (LC-MS) analysis. This work provides a promising strategy for the design of energy-conversion materials towards capturing solar and mechanical energy in ambient environment.

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Resources Conservation and Recycling (impact factor: 13.22) 1 区

Evidence of animal productivity outcomes when fed diets including food waste: A systematic review of global primary data

Yingcheng Wang · Sarah Rassler · Darko Stefanovski, et.al

Abstract:
Enormous amounts of food waste are generated that could potentially be used for livestock feeding to support sustainable food production and reduce climate and resource burdens. Many studies have documented animal productivity parameters (growth, yield, feed use efficiency) when fed food waste, but their findings remain fragmented. Our objective is to synthesize results from these studies to uncover collective evidence on how animal productivity is affected. A systematic literature review identified 102 studies, which originated from 31 countries and encompassed all major food-producing animal species fed food waste of various types and rates. The field-based primary data were normalized to discern patterns and trends. Animals in 75–77 % of all cases performed as optimally or increased productivity compared to those fed control diet; the remaining 23–25 % had decreased performance. Meta-analysis of a subset of data indicated that pig growth did not differ between control and treatment diets of varying food waste rates. Ultimately, balancing major nutrients from all feed ingredients are key for maintaining optimal productivity while pursuing sustainability.

Resources Conservation and Recycling (impact factor: 13.22) 1 区

Revealing the long way towards lead-free plastic in China through dynamic material flow analysis of lead salt heat stabilizers in PVC products

Tengyun Ma · Wei Liu · Mengyan Bi, et.al

Abstract:
The use of lead salt heat stabilizers (LHSs) in plastics are restricted or even prohibited owing to their high toxicity. However, little information is available on its industrial metabolism. A dynamic material flow analysis of LHSs indicates that China consumed 2952 kt LHSs between 1958 and 2020. Moreover, at present, 1020 kt of these is being used in polyvinyl chloride (PVC) products, 1007 kt is in landfills, and 681 kt is in the environment. For China to realize lead-free primary plastics by 2040, 2050, and 2060, the LHSs consumption should be reduced by at least 13 %, 10 %, and 9 % annually, respectively. Certain LHSs would gain new life with PVC recycling. Therefore, approximately 30 years would be required for LHSs to disappear completely after their use is stopped. With improvements in the plastic recycling rate, it is necessary to use chemical recycling and other methods to separate the hazardous additives such as LHSs and reduce the circulation of toxic substances.

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Computers Environment and Urban Systems (impact factor: 6.84) 1 ☒

Enhancing geospatial retail analysis by integrating synthetic human mobility simulations

Santiago Garcia-Gabilondo · Yuya Shibuya · Yoshihide Sekimoto

Abstract:
The accuracy of retail location models depends on their precise calibration, but the data necessary for such a key task is seldom available. In this research, we use synthetic human mobility data, which introduces commuting dynamics, to improve the reliability of such models. We use the origin-destination flows to distribute households' potential expenditures in their home and commuting locations with the aim of modeling non-residential-driven demand in the commercial streets of Tokyo. We estimate potential revenues of commercial streets using the Huff model with its conventional specification as well as a variation of it that adopts pedestrian trajectory counts as the deterrence variable. We found that redistributing the potential expenditures toward the households' daytime locations significantly increased the model's performance. Additionally, we found that our use of pedestrian trajectory counts is comparable to using distance within the Huff model framework, but our proposed model was still outperformed by the conventional Huff model specification. We conclude that combining synthetic human mobility simulations and retail location models significantly increases the reliability of analysis in data-constrained situations.

Computers Environment and Urban Systems (impact factor: 6.84) 1 ☒

A novel framework for road vectorization and classification from historical maps based on deep learning and symbol painting

Chenjing Jiao · Magnus Heitzler · Lorenz Hurni

Abstract:
Road networks in the past are imperative for understanding evolution of transportation infrastructure, urban sprawl, and route planning, etc. Various approaches have been developed for road extraction from historical maps, among which deep learning techniques stand out as the most effective ones. However, little attention has been paid to investigating road vectorization and classification from historical maps. Moreover, road classification via machine learning methods usually requires large amounts of dedicated training data. To address these issues, this paper proposes a novel and comprehensive framework for road vectorization and classification on the basis of road segmentation from historical maps. First, deep learning is used to get pixel-wise raster road segmentation results, which are further skeletonized using morphological operations. Then, considering that each road class is represented with a certain symbol, a painting function is defined for each class able to paint the corresponding symbol. These painting functions are then used to draw road segments along the skeletons. Since the start and end points in each painting function are used to vectorise the segment, this method achieves vectorization and

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classification at the same time. Our method is validated on four Siegfried map sheets in Switzerland, and evaluated via both visual and quantitative assessments. The results indicate that the method is capable of classifying roads accurately. In particular, two evaluation metrics completeness and correctness achieve 90.69% and 72.71% respectively for road class 2 which accounts for the highest portion in the map. Moreover, the results of this method avoid the saw-toothed issue of vectorised road lines. This research is beneficial for creating complete vector road network datasets with class information to support decision-making in urban planning and transportation.

Computers Environment and Urban Systems (impact factor: 6.84) 1 ☒

A simple agent-based model for planning for bicycling: Simulation of bicyclists' movements in urban environments

Parisa Zare · Simone Leão · Ori Gudes et.al

Abstract:
As deep learning technology becomes advanced, mobile vision applications such as augmented reality (AR) or autonomous vehicles are prevalent. The performance of such services highly depends on computing capability of different mobile devices, dynamic service requests, stochastic mobile network environment, and learning models. Existing studies have independently optimized such mobile resource allocation and learning model design with given other side of parameters and computing/network resources. However, they cannot reflect realistic mobile environments since the time-varying wireless channel and service requests are assumed to follow specific distributions. Without these unrealistic assumptions, we propose an algorithm that jointly optimizes learning models and process/network resources adapting to system dynamics, namely VisionScaling by leveraging the state-of-the-art online convex optimization (OCO) framework. This VisionScaling jointly makes decisions on (i) the learning model and the size of input layer at learning-side, and (ii) the GPU clock frequency, the transmission rate, and the computation offloading policy at resource-side every time slot. We theoretically show that VisionScaling asymptotically converges to an offline optimal performance with satisfying sublinearity. Moreover, we demonstrate that VisionScaling saves at least 24% of dynamic regret which captures energy consumption and processed frames per second (PFPS) under mean average precision (mAP) constraint via real trace-driven simulations. Finally, we show that VisionScaling attains 30.8% energy saving and improves 39.7% PFPS while satisfying the target mAP on the testbed with Nvidia Jetson TX2 and an edge server equipped with high-end GPU.

Computers Environment and Urban Systems (impact factor: 6.84) 1 ☒

Towards healthcare access equality: Understanding spatial accessibility to

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healthcare services for wheelchair users

Kun Chen · Pengxiang Zhao · Kun Qin et. al

Abstract:
Considering that the number of wheelchair users is on the rise at the global level due to population aging, it is crucial to secure their rights to have adequate access to healthcare services. Spatial accessibility to healthcare services has been well recognized to influence people's health. However, research on healthcare accessibility of wheelchair users is scarce. This study proposes a barrier-free path planning method to estimate wheelchair users' travel time as the measurement of their accessibility. A study on Wuhan, China, is conducted to evaluate the spatial accessibility to healthcare services for wheelchair users and compare it with the general population. The results show that: (1) the levels of healthcare accessibility are unevenly distributed across the city center and the periphery of the study area for both wheelchair users and the general population, while wheelchair users have lower accessibility overall; (2) both similarities and differences in hospital and travel mode selection to access healthcare services co-exist in the study area between the two groups; (3) significant inequality in healthcare accessibility is observed in Hongshan and Qingshan districts. The research findings are beneficial for policymakers to further improve healthcare accessibility and its equality by optimizing the allocation of hospital resources and barrier-free public transport.

HEALTH, TOXICOLOGY AND MUTAGENESIS

Particle and Fibre Toxicology (impact factor: 10.04) 1 ☒

In vitro inflammation and toxicity assessment of pre- and post-incinerated organomodified nanoclays to macrophages using high-throughput screening approaches

odd A. Stueckle · Jake Jensen · Jayme P. Coyle et.al

Abstract:
Background
Organomodified nanoclays (ONC), two-dimensional montmorillonite with organic coatings, are increasingly used to improve nanocomposite properties. However, little is known about pulmonary health risks along the nanoclay life cycle even with increased evidence of airborne particulate exposures in occupational environments. Recently, oropharyngeal aspiration exposure to pre- and post-incinerated ONC in mice caused low grade, persistent lung inflammation with a pro-fibrotic signaling response with unknown mode(s) of action. We hypothesized that the organic coating presence and incineration status of nanoclays determine the inflammatory cytokine secretary profile

and cytotoxic response of macrophages. To test this hypothesis differentiated human macrophages (THP-1) were acutely exposed (0–20 μg/cm2) to pristine, uncoated nanoclay (CloisNa), an ONC (Clois30B), their incinerated byproducts (I-CloisNa and I-Clois30B), and crystalline silica (CS) followed by cytotoxicity and inflammatory endpoints. Macrophages were co-exposed to lipopolysaccharide (LPS) or LPS-free medium to assess the role of priming the NF-κB pathway in macrophage response to nanoclay treatment. Data were compared to inflammatory responses in male C57Bl/6J mice following 30 and 300 μg/mouse aspiration exposure to the same particles.

Results

In LPS-free media, CloisNa exposure caused mitochondrial depolarization while Clois30B exposure caused reduced macrophage viability, greater cytotoxicity, and significant damage-associated molecular patterns (IL-1α and ATP) release compared to CloisNa and unexposed controls. LPS priming with low CloisNa doses caused elevated cathepsin B/Caspage-1/IL-1β release while higher doses resulted in apoptosis. Clois30B exposure caused dose-dependent THP-1 cell pyroptosis evidenced by Cathepsin B and IL-1β release and Gasdermin D cleavage. Incineration ablated the cytotoxic and inflammatory effects of Clois30B while I-CloisNa still retained some mild inflammatory potential. Comparative analyses suggested that in vitro macrophage cell viability, inflammasome endpoints, and pro-inflammatory cytokine profiles significantly correlated to mouse bronchioalveolar lavage inflammation metrics including inflammatory cell recruitment.

Conclusions

Presence of organic coating and incineration status influenced inflammatory and cytotoxic responses following exposure to human macrophages. Clois30B, with a quaternary ammonium tallow coating, induced a robust cell membrane damage and pyroptosis effect which was eliminated after incineration. Conversely, incinerated nanoclay exposure primarily caused elevated inflammatory cytokine release from THP-1 cells. Collectively, pre-incinerated nanoclay displayed interaction with macrophage membrane components (molecular initiating event), increased pro-inflammatory mediators, and increased inflammatory cell recruitment (two key events) in the lung fibrosis adverse outcome pathway.

Journal of Hazardous Materials (impact factor:13.61) 1 区

Organic Pollutants Adsorbed on Microplastics: Potential Indicators for Source Appointment of Microplastics

Xin Chen · Xilong Yu · Lei Zhang et.al

Abstract:

Pollution by microplastics (MPs) has caused potential threats to the environment. Understanding the sources of MPs in the environment can help control their emissions

and reduce environmental risks. Source apportionment of MPs has been conducted according to the characteristics of MPs themselves (such as types of polymers and morphological characteristics). However, the specificity and resolution of the appointments of sources need to be improved. Organic pollutants adsorbed on MPs can be used as a novel and reliable indicator to identify the source of MPs in the environment. In the present work, the analytical methods of MPs and organic pollutants adsorbed on MPs were critically reviewed, and the occurrence of organic pollutants and factors influencing their adsorption on MPs were discussed. Furthermore, the potential applications of organic pollutants adsorbed on MPs as indicators for determining the sources of MPs were highlighted. The study would help recognize the sources of MPs, which will support efforts aimed at reducing their emissions and further pollution of the ecosystem.

Journal of Hazardous Materials (impact factor:13.61) 1 区

Facile synthesis of ball-milling and oxalic acid co-modified sludge biochar to efficiently activate peroxymonosulfate for sulfamethoxazole degradation: 1O2 and surface-bound radicals

Xi Chen · Jinyao Zhu · Yongfei Ma et.al

Abstract:

A novel approach of ball milling and oxalic acid was employed to modify sludge-based biochar (BOSBC) to boost its activation performance for peroxymonosulfate (PMS) towards efficient degradation of sulfamethoxazole (SMX). 98.6% of SMX was eliminated by PMS/BOSBC system within 60 min. Furthermore, PMS/BOSBC system was capable of maintaining high removal rates for SMX (>88.8%) in a wide pH range from 3 to 9, and displayed a high tolerance to background electrolytes including inorganic ions and humic acid (HA). Quenching experiments, electron paramagnetic resonance (EPR) analysis, in-situ Raman characterization and PMS decomposition experiments confirmed that the non-radicals of 1O2 and surface-bound radicals were the main contributors to SMX degradation by PMS/BOSBC system. The results of ecotoxicity assessment illustrated that all transformed products (TPs) generated in PMS/BOSBC system were less toxic than that of SMX. After five reuse cycles, PMS/BOSBC system still maintained a high removal rate for SMX (77.8%). Additionally, PMS/BOSBC system exhibited excellent degradation performance for SMX in various real waters (Yangtze River water (76.5%), lake water (74.1%), tap water (86.5%), and drinking water (98.1%)). Overall, this study provided novel insights on non-metal modification for sludge-based biochar and non-radical mechanism, and offered a feasible approach for municipal sludge disposal.

Journal of Hazardous Materials (impact factor:13.61) 1 区

Geochemical distribution and environmental assessment of potentially toxic elements in farmland soils, sediments, and tailings from phosphate

industrial area (NE Algeria)

Bilal Boumaza · Rabah Kechiched · T.V. Chekushina et.al

Abstract

This study investigates the extent and spatial distribution of Potentially Toxic Elements (PTEs) in the Djebel Onk phosphate mine area in south-eastern Algeria, as well as the associated risks to human health. Various scales are considered and sampled, including tailing waste (n = 8), surrounding farmland soil (n = 21), and sediments (n = 5). The samples were mineralogically and chemically analyzed using XRD, FTIR, XRF, and ICP-MS techniques. Principal Component Analysis (PCA) was applied after transforming the raw data into centered-log ratios (clr) to identify the dominant factors controlling the distribution of PTEs. Furthermore, pollution assessment was conducted using several indices, including geo-accumulation, pollution load, contamination security indices, and enrichment and contamination factors. The results reveal that the analyzed samples are mostly P-enriched in the mine tailings, farmland soil, and sediments, with P2O5 concentrations ranging from 13.37 wt% to 26.17 wt%, 0.91–21.70 wt%, and 17.04–29.41 wt%, respectively. The spatial distribution of PTEs exhibits clearly a decrease in the contents of CaO, P2O5, Cr, Sr, Cd, and U with increasing distance from the mine discharge site, while other oxides, such as MgO, Al2O3, SiO2, K2O, and Fe2O3, and associated elements (Cu, Co, Pb, and Zn), show an increase. PCA confirms the influence of minerals such as, apatite, dolomite, and silicates on the distribution PTEs. It denoted that the highest contamination level of all PTEs in soils and sediments was observed in the southern part of the plant and mine tailings compared to the northern part. In terms of human health risks, the assessment reveals that the hazard index (HI) values for both non-carcinogenic and carcinogenic risks associated with PTEs in the study area are below 1, suggesting no significant risk. However, regardless of the sample type, the lifetime cancer risk (LCR) values vary from 1.69E-05–2.11E-03 and from 1.03E-04–2.27E-04 for Cr, Ni, As (children) and Cd (adults), respectively, exceeding the safe levels recommended by the United States Environmental Protection Agency. The study highlights that oral ingestion poses the greatest risk, followed by dermal contact and particle inhalation. Importantly, all these indices decrease with increasing distance from the sampling site to the waste discharge point and the factory, which indicates that the phosphate mining activity had caused some extent risks. These findings provide valuable insights for mitigating the adverse health impacts and guiding environmental management efforts.

Journal of Hazardous Materials (impact factor:13.61) 1 区

Dual valorization of coastal biowastes for tetracycline remediation and biomethane production: A composite assisted anaerobic digestion

Mohamed El-Qelish · Ali Maged · Khalid Z. Elwakeel et.al

Abstract

Harnessing coastal biowaste for dual valorization in water treatment and biofuel production holds paramount importance for sustainability and resource challenges. This study investigated the potential of engineered composite (CABC) derived from coastal biowaste-based materials for tetracycline (TC) removal and biomethane production. High-yield calcium carbonate (CaCO3; 95.65%; bivalve shells) and biochar (GA-BC; 41.50%; green macroalgae) were produced and used as precursors for CABC. The characterization results revealed presence of β-CaCO3 and v2-CO3 aragonite in CaCO3, and composite homogeneity was achieved. The CABC exhibited a maximum TC sorption capacity of 342.26 mg/g via synergistic sorption mechanisms (i.e., surface/pore filling, electrostatic attraction, calcium ion exchange, and chelation). Supplementation of anaerobic digestion process with GA-BC, CaCO3, and CABC was investigated via three consecutive cycles. Biochemical methane potential of glucose as a sole substrate was increased from 157.50 to 217.00, 187.00, and 259.00 mL-CH4, while dual substrate (glucose+TC) treatment was increased from 94.5 to 146.5, 129.0, and 153.00 mL-CH4 for GA-BC, CaCO3, and CABC, respectively. Moreover, system stability and TC removal were increased with the addition of GA-BC (40.90%), CaCO3 (16.30%), and CABC (53.70%). Therefore, this study exemplifies the circular bioeconomy approach, demonstrating the sustainable use of biowaste-derived composite for water treatment and biofuel production.

Ecology

Landscape and Urban Planning (impact factor: 9.14) 1 ☒

Perceptions of ecosystem services and knowledge of sustainable development goals around community and private wetlands users in a rapidly growing city

Sukanya Basu · Harini Nagendra · Peter Verburg et.al

Abstract

Urban wetlands are well-known to provide multiple ecosystem services and are essential for achieving the UN Sustainable Development Goals (SDGs). The management practices of local institutions are strongly influential on the sustainability outcomes of urban wetlands, yet the beliefs and value systems underlying distinct management approaches have not been studied thoroughly. Therefore, this study aims to elucidate the perceptions of local stakeholders regarding the ecosystem services provided by urban wetlands, their linkages to the SDGs, and pertinent threats to the wetlands, to reveal the connections between local awareness and sustainable management practices. Using the East Kolkata Wetlands (EKW) in India as a case study, we used a mixed-method approach to interview 120 local stakeholders associated with two differentially managed wetland systems – community and private. Our results demonstrate that the community wetlands are more socially inclusive in nature than the private wetlands. The private users emphasized economic benefits and livelihood

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security above all, whereas the community users strongly valued diverse provisioning services and cultural services in addition to the livelihood security. Further, community users identified a greater number of ecosystem services as contributing toward the SDGs relative to private users. We suggest that sustainable development strategies consult and incorporate the perceptions of local community wetland management groups, as these management practices are rooted in more comprehensive value systems and are more aligned with sustainable outcomes. These insights reveal the importance of local awareness of ecosystem services, and may be of value to urban planners and policymakers working toward sustainable urban management.

Landscape and Urban Planning (impact factor: 9.14) 1 ☒

A methodological approach for integrating human emotions in protected areas management: Insights from SE Spain

Enrica Garau · Juan M. Requena-Mullor et.al

Abstract

Protected areas (PAs) are pivotal as conservation strategies for safeguarding global biodiversity (CBD, 1992). In 2021, the global coverage of designated PAs reached 16.64 % of terrestrial and inland water surface and 7.74 % of the marine surface (UNEP-WCMC & IUCN, 2021). The global target is to protect 30 % of the Earth's land and sea by 2030 (UNEP-CBD, 2020). Despite significant global progress in conservation efforts, there is still much work to be done as time is running out, and biodiversity loss continues at an unprecedented rate globally (IPBES, 2019). This scenario has sparked a widespread debate regarding the contribution and effectiveness of PAs for biodiversity conservation. While studies suggest that many PAs effectively contribute to conserving habitats and species (e.g., Feng et al., 2021), some scholars increasingly warn that inappropriate management of certain natural spaces can hinder their ability to benefit and conserve biodiversity (e.g., Hoffmann et al., 2018, Wauchope et al., 2022). Considerable discussion has focused on the factors influencing the effective management of PAs to ensure biodiversity conservation. These factors include the absence of sound policies and legislation, sustained investment and resources, the development of individual and institutional capacities (Borrini-Feyerabend et al., 2013), scientific and technical support (Wauchope et al., 2022), social inclusion of people in PAs management (Raymond et al., 2022), and cooperation between stakeholders across sectors and levels (Brondizio & Le Tourneau, 2016). A growing body of scientific evidence suggests that taking into account the preferences, values, and emotional responses of people living in or visiting PAs is crucial for successful PAs management (Pelegrina-López et al., 2018). However, there is still limited knowledge about the specific role that the emotions people develop in and with nature play in conservation efforts and how they can inform landscape management (Castro et al., 2023). Aiming at incorporating social input into PAs governance, the scientific community has made significant progress in developing various social research methods and participatory

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approaches over the past decades. These methods aim to gather both individual and collective information from people using quantitative and qualitative techniques (Lynam et al., 2007). Examples of these methods include public participation, geographical information systems, oral histories, and participatory scenario planning (Torralba et al., 2022). Most of these methods are usually applied in different formats (e.g., surveys, interviews, focus groups, and workshops) and combined in various research process steps for different purposes (e.g., analyzing complex social-ecological issues, defining sustainability challenges, and establishing collective solutions). Most research methods applied to integrate social considerations into conservation governance have primarily concentrated on analyzing social perceptions towards PAs to evaluate local support (Bennett et al., 2019), assess conflicts among stakeholders (Ehrhart et al., 2022), and identify values toward nature (Jones et al., 2016). While this diverse array of methods has proven effective in gathering valuable social information for PA management from a cognitive perspective, capturing the emotional bonding of people has yet to be achieved through these methods.

To this end, it is crucial to capture the various forms of connection and disconnection that shape how people relate to nature (Bernaldez et al., 1984, Pramova et al., 2021). This pressing research question is not new. In the eighteenth century, Alexander von Humboldt advocated for the need to experience and understand the management of natural systems through the emotional and affective relationships people develop in and with nature (Abello and Bernaldez, 1986, von Humboldt, 2014). Similarly, at the end of the 20th century, the Spanish biologist Fernando González Bernáldez postulated that part of the origin of our cognitive and emotional processes associated with landscape perception is rooted in the coevolution between people and nature (Bernaldez, 1985, Castro et al., 2023). These ideas are even more relevant today, given the urgent need for new practical tools to help PAs managers design strategies to mitigate biodiversity loss. To move in this direction, it seems fundamental to advance understanding of the factors that shape our emotions and affective experiences in and with the natural world, defining the emotional and affective dimension as the moods, feelings, and emotions that humans can experience in and with nature (Pramova et al., 2021). However, there is still no solid agreement within the scientific community regarding how emotional experiences in and with nature should be assessed and how they can contribute to reconciling conservation issues and informing landscape management (El Ghafraoui, Quinutas-Soriano, Pachecho-Romero, Murillo-López, & Castro, 2023; Pramova et al., 2021, Zylstra et al., 2014).

To the best of our knowledge, although the emotional relationship between landscapes and people has recently been analyzed in the southeast of Spain (Castro et al., 2023, Otamendi-Urroz et al., 2023), no study has yet analyzed the diversity of emotions that PAs generate in people and how this translates in terms of conservation outcomes. Recognizing and addressing this research gap can be used for integrating into PAs management a new piece of information that describes the emotional dimension between people and nature (or PAs). Advancing in this direction can be particularly

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relevant for PAs located in arid ecosystems in SE Spain, the driest region of all Europe, where PAs deviate from the common imaginary of spaces characterized by green forests and blue rivers, instead being represented by yellow and treeless areas. This aspect may have implications for PAs management, given that people inhabiting dry regions have a poor perception of the value of these ecosystems (Castro et al., 2011; Castro et al., 2018), leading to less social support and influenced conservation policies. According to this hypothesis, the main goal of this study is to present a spatial and explicit approach to unravel and quantify the emotional connection between people and PAs in arid Spain, proposing a quantitative measure, the Emotional Nonparametric Relation Index (ENRI). To accomplish this goal, we selected a range of different PAs located in southeast Spain and established the following specific objectives: (1) to quantify and map the diversity of emotions that people associate with different PAs; (2) to measure the emotional relationship between people and PAs by proposing an Emotional Nonparametric Relation Index (ENRI); and (3) to explore the role of different levels of aridity in the emotional connection between people and PAs. Finally, we will reflect on the potential implications for PAs management.

Landscape and Urban Planning (impact factor: 9.14) 1 区

Developing the health effect assessment of landscape (HEAL) Tool: Assessing the health effects of community greenspace morphology design on non-communicable diseases

Huaqing Wang · Louis G. Tassinary · Galen D. Newman

Abstract

Neighborhood greenspace benefits health, yet few tools are available for estimating the health consequences of community greenspace design alternatives, especially prior to the implementation of a landscape design plan. Herein we present a machine learning based tool for predicting the prevalence of non-communicable diseases based on landscape design maps at the community scale. We achieve this based on data collected in five major metropolises in the United States. By using high-resolution satellite imagery and remote sensing technologies, landscape spatial design characteristics were extracted through spatial pattern analysis, allowing the measurement of verdancy, fragmentation, connectedness, aggregation, and shape of greenspaces. We established a model to estimate the prevalence of poor mental health, coronary heart disease, stroke, diabetes, chronic obstructive pulmonary disease, and physical inactivity at the census tract level by adopting a combination of random forest decision tree algorithm and spatial Gaussian process models. Model accuracy was found to be significantly higher than ordinary regression models. The model accounted for very high levels of variance in the specified morbidities; viz., poor mental health (97%), heart disease (93%), stroke (93%), diabetes (95%), COPD (94%), and physical inactivity (98%). This tool is implemented using a freely available programming language (R), and we offer the model accessible to the public. This tool enables urban planners and landscape

designers to assess and compare the health effects of different greenspace design plans prior to implementation, thus providing policymakers and designers with evidence-rich alternatives during the health-promoting greenspace planning process.

Agriculture Ecosystems & Environment (impact factor: 6.64) 1 ☒

Smallholder agriculture in African dryland agroecosystems has limited impact on trophic group composition, but affects arthropod provision of ecosystem services

Klaus Birkhofer · Tharina Bird · Martha Alfeus et al

Abstract

Agricultural intensification is a major driver of biodiversity loss, but the majority of studies highlighting these threats come from industrialised agriculture in temperate countries of the global North. However, more than 30% of global food production is produced by smallholder farmers, particularly in Africa. We know very little about the impact of these farming practices on arthropod communities and associated ecosystems in dryland agroecosystems. We investigated the trophic group composition of arthropod communities (detritivorous, herbivorous, predatory & mixed feeders) and levels of associated ecosystem functions in replicated maize fields, paired adjacent natural bushveld habitats and the edge habitats between them in north-eastern Namibia and central-eastern Botswana during the dry and wet seasons. Predator activity densities differed significantly between habitats depending on the season, with higher numbers in natural habitats in the wet season but lower numbers in the dry season compared to maize fields. In general, edge habitats had higher numbers of predators than the other habitats. Predator attack rates on artificial caterpillars in both seasons and dung removal in the wet season were higher in habitats with natural vegetation (natural and edge). However, dung removal in the dry season and herbivory in the wet season were highest in the maize fields, the latter due to high level of fall armyworm infestation. Wet season multifunctionality was higher in natural habitats in Botswana, and to a lesser extent in Namibia, than in maize fields. Smallholder agriculture is not detrimental to decomposers, herbivores and mixed feeders compared to adjacent natural habitats, but may be detrimental to the provision of some ecosystem services. These results highlight the challenge of sustainably managing dryland agricultural land that is marginal for crop production, while providing smallholders with an optimal environment to benefit from the ecosystem services associated with arthropod communities. New conservation agriculture practices need to support the production of higher and more stable yields over time, while maintaining the limited impact of smallholder agriculture on biotic communities.

Agriculture Ecosystems & Environment (impact factor: 6.64) 1 ☒

Leguminous cover orchard improves soil quality, nutrient preservation capacity, and aggregate stoichiometric balance: A 22-year homogeneous

experimental site

Wenqing Li · Yaojun Liu · Jian Duan et.al

Abstract

Soil and water conservation measures, widely promoted to control soil erosion in erosive orchards, can alter soil aggregates, thereby influencing the soil quality index (SQI). However, it's still unclear how these measures affect soil aggregate nutrients, stoichiometry, and their association with SQI at a long-term timescale. This study focused on a 22-year homogeneous orchard in subtropical hilly region. Five soil and water conservation measures, namely clean tillage (CT), engineering measures (EM), tillage measures (TM), non-leguminous biological measures (NLBM), and leguminous biological measures (LBM), were implemented. Sampling depths were 0–20 cm, 20–40 cm, and 40–60 cm. The results revealed that LBM significantly enhanced SQI across the soil profile, increased the proportion of macroaggregates, and improved aggregate stability, soil organic carbon, and total nitrogen. Additionally, LBM demonstrated the highest capacity for carbon and nitrogen preservation. Soil stoichiometry revealed carbon and nitrogen limitations in the orchard soils, and leguminous cover proved effective in alleviating these limitations and maintaining the stoichiometric balance of soil aggregates. Under a long-term timescale, these measures mitigated or even surpassed the impact of soil depth on soil aggregates and SQI. The improvement of orchard SQI through the measures was primarily achieved by enhancing aggregate stability. There was no significant correlation between soil organic carbon and SQI in relation to fruit yield, ascribed to the intense competition for water and nutrients between cover plants and citrus trees. In conclusion, LBM emerges as the most beneficial soil and water conservation measure for enhancing orchard SQI, preserving nutrients, and maintaining aggregate stoichiometric balance. It holds the potential to improve orchard yield and contribute to sustainable development.

WATER SCIENCE AND TECHNOLOGY

Desalination (impact factor: 9.93) 1 ☒

A novel strategy for retarding membrane wetting under electrical field: Embedding silver nanowires into UiO-66-NH2/graphene oxide composite thin membrane

Chuqing Cao · Fengnan Liu · Fangqing Li et.al

Abstract

Membrane distillation (MD) is a promising desalination technology that combines traditional distillation processes with membrane separation technology, but when the feed solution contains amphiphilic substances such as surfactant, the hydrophobic membrane is prone to being wetting, which hinders its widespread application. In this

study, a novel Janus membrane was developed by embedding Zr-MOF and silver nanowires into the modified graphene oxide composite membrane to improve its separation performance, and the effect of high-concentration SDS on the membrane performance was studied. The experimental results showed that the conductive membrane exhibited excellent performance when powered on for 5 min every 2.5 h under 2 V voltage. The flux stabilized at 19.6 L/(m2h) with a desalination rate up to 99.9 % and no obvious signs of membrane wetting. It was found that the effect of electric field caused a negative charge on the membrane surface, forming a charge repulsion force with the SDS. Simultaneously, intermittent electrical flotation can effectively remove SDS that has accumulated on the membrane surface, thus achieving efficient and stable operation of MD system. Moreover, a machine learning approach with Catboost was applied to predict and unveil the complex effects on membrane performance, providing a deep insight to treat wastewater containing surfactant.

Desalination (impact factor: 9.93) 1 ☒

Biomass derived evaporator with highly interconnected structure for eliminating salt accumulation in high-salinity brine

Wei Wang · Zhimei Tian · Ning He, et.al

Abstract:
Solar-driven evaporator is regarded as an energy-saving and eco-friendly desalination technology. However, available unfriendly synthetic materials and salt crystallization problems limit the evaporator's performance and development, especially in high-salinity condition. Hence, inspired by the highly interconnected microchannels, a carbonized white gourd (CWG) derived self-desalting evaporator was developed to evaporate and desalinate seawater. To evaluate the efficacy of the porous features, the effect of different porosity configurations on water evaporation and anti-salt abilities of CWG was discussed. High and stable evaporation rates of 1.76 and 1.44 kg·m−2·h−1 were reached for 3.5 wt% and 20 wt% NaCl solutions, respectively, which were attributed to the highly efficient water transport and self-desalting capabilities, and it further increased to 2.19 kg·m−2·h−1 by adding an extra convective air (2 m/s) located at the evaporation interface. Moderate airflow effectively enhanced the evaporation efficiency and delayed re-crystallization of salt, promoting a long-term stable desalination process. Conversely, excessive convective flow (4 m/s) may directly impair evaporative stability and salt resistance. This research is expected to provide a new insight into the design of high performance, low cost, eco-friendly and salt-resistant evaporator applied to solar desalination.

Hydrology and Earth System Sciences (impact factor: 6.31) 1 ☒

Empirical stream thermal sensitivity cluster on the landscape according to geology and climate

Abstract:
Climate change is modifying river temperature regimes across the world. To apply management interventions in an effective and efficient fashion, it is critical to both understand the underlying processes causing stream warming and identify the streams most and least sensitive to environmental change. Empirical stream thermal sensitivity, defined as the change in water temperature with a single degree change in air temperature, is a useful tool to characterize historical stream temperature conditions and to predict how streams might respond to future climate warming. We measured air and stream temperature across the Snoqualmie and Wenatchee basins, Washington, during the hydrologic years 2015–2021. We used ordinary least squares regression to calculate seasonal summary metrics of thermal sensitivity and time-varying coefficient models to derive continuous estimates of thermal sensitivity for each site. We then applied classification approaches to determine unique thermal sensitivity regimes and, further, to establish a link between environmental covariates and thermal sensitivity regimes. We found a diversity of thermal sensitivity responses across our basins that differed in both timing and magnitude of sensitivity. We also found that covariates describing underlying geology and snowmelt were the most important in differentiating clusters. Our findings and our approach can be used to inform strategies for river basin restoration and conservation in the context of climate change, such as identifying climate-insensitive areas of the basin that should be preserved and protected.

Hydrology and Earth System Sciences (impact factor: 6.31) 1 ☒

Process-based three-layer synergistic optimal-allocation model for complex water resource systems considering reclaimed water

Fei Liu • Yue‐Ping Xu • Wei Zhang, et al

Abstract:
The increasing water demand due to human activities has aggravated water scarcity, and conflicts among stakeholders have increased the risk of unsustainable development. Ignoring the effects of trade-offs leads to misguided policy recommendations. This study highlights the concept of synergy among different aspects of the water allocation process. A process-based three-layer synergistic optimal-allocation (PTSOA) model is established to integrate the interests of stakeholders across sub-regions, decision levels, and time steps while simultaneously coupling reclaimed water to establish environmentally friendly solutions. A synergy degree index is constructed by applying network analysis for optimization. PTSOA is applied in Yiwu, southeast China, and is shown to be able to improve the contradictions among different dimensionalities in a complex system. Overall, 2.43×107–3.95×107 m3 of conventional water is saved, and notable improvements in management are achieved. The application demonstrates the

efficiency and excellent performance of the PTSOA model.

Hydrology and Earth System Sciences (impact factor: 6.31) 1 ☒

Effects of high-quality elevation data and explanatory variables on the accuracy of flood inundation mapping via Height Above Nearest Drainage

Fernando Aristizabal · Taher Chegini · Gregory Petrochenkov, et al

Abstract:

Given the availability of high-quality and high-spatial-resolution digital elevation maps (DEMs) from the United States Geological Survey's 3D Elevation Program (3DEP), derived mostly from light detection and ranging (lidar) sensors, we examined the effects of these DEMs at various spatial resolutions on the quality of flood inundation map (FIM) extents derived from a terrain index known as Height Above Nearest Drainage (HAND). We found that using these DEMs improved the quality of resulting FIM extents at around 80 % of the catchments analyzed when compared to using DEMs from the National Hydrography Dataset Plus High Resolution (NHDPlusHR) program. Additionally, we varied the spatial resolution of the 3DEP DEMs at 3, 5, 10, 15, and 20 m (meters), and the results showed no significant overall effect on FIM extent quality across resolutions. However, further analysis at coarser resolutions of 60 and 90 m revealed a significant degradation in FIM skill, highlighting the limitations of using extremely coarse-resolution DEMs. Our experiments demonstrated a significant burden in terms of the computational time required to produce HAND and related data at finer resolutions. We fit a multiple linear regression model to help explain catchment-scale variations in the four metrics employed and found that the lack of reservoir flooding or inundation upstream of river retention systems was a significant factor in our analysis. For validation, we used Interagency Flood Risk Management (InFRM) Base Level Engineering (BLE)-produced FIM extents and streamflows at the 100- and 500-year event magnitudes in a sub-region in eastern Texas.

Ⅱ Concentration

PHYSICS

Effects of Molecular Noise on Cell Size Control

Motasem ElGamel, Andrew Mugler

Abstract

Cells employ control strategies to maintain a stable size. Dividing at a target size (the "sizer" strategy) is thought to produce the tightest size distribution. However, this result follows from phenomenological models that ignore the molecular mechanisms required to implement the strategy. Here we investigate a simple mechanistic model for exponentially growing cells whose division is triggered at a molecular abundance threshold. We find that size noise inherits the molecular noise and is consequently minimized not by the sizer but by the "adder" strategy, where a cell divides after adding a target amount to its birth size. We derive a lower bound on size noise that agrees with publicly available data from six microfluidic studies on Escherichia coli bacteria.

Geometry-Sensitive Protrusion Growth Directs Confined Cell Migration

Johannes Flommersfeld, Stefan Stöberl, Omar Shah, et al.

Abstract

The migratory dynamics of cells can be influenced by the complex microenvironment through which they move. It remains unclear how the motility machinery of confined cells responds and adapts to their microenvironment. Here, we propose a biophysical mechanism for a geometry-dependent coupling between cellular protrusions and the nucleus that leads to directed migration. We apply our model to geometry-guided cell migration to obtain insights into the origin of directed migration on asymmetric adhesive micropatterns and the polarization enhancement of cells observed under strong confinement. Remarkably, for cells that can choose between channels of different size, our model predicts an intricate dependence for cellular decision making as a function of the two channel widths, which we confirm experimentally.

Demixing in Binary Mixtures with Differential Diffusivity at High Density

Erin McCarthy, Raj Kumar Manna, Ojan Damavandi, et al.

Abstract

Spontaneous phase separation, or demixing, is important in biological phenomena such as cell sorting. In particle-based models, an open question is whether differences in diffusivity can drive such demixing. While differential-diffusivity-induced phase separation occurs in mixtures with a packing fraction up to 0.7 [S. N. Weber et al. Binary mixtures of particles with different diffusivities demix, Phys. Rev. Lett. 116, 058301 (2016)], here we investigate whether demixing persists at even higher densities relevant for cells. For particle packing fractions between 0.7 and 1.0 the system demixes, but at packing fractions above unity the system remains mixed, exposing re-entrant behavior in the phase diagram that occurs when phase separation can no longer drive a change in entropy production at high densities. We also find that a confluent Voronoi model for tissues does not phase separate, consistent with particle-based simulations.

MATERIALS

High-temperature anion-exchange membrane fuel cells with balanced water management and enhanced stability

Jiandang Xue, John C. Douglin, Karam Yassin, et al.

Abstract

Over the last decade, anion-exchange membrane fuel cells (AEMFCs) have continued to show steady power output and durability improvements at low temperatures of 60°C–80°C. However, AEMFC durability still lags, largely due to the critical issue of water management. High-temperature operation ($\geqslant 100^\circ$ C) enables simplified water management, but additional material stability challenges remain, particularly concerning the chemical stability of the anion-exchange membranes (AEMs). Herein, we report the synthesis of lightly branched poly(arylene piperidinium) AEMs, leading to balanced water management and sufficient stability. The optimized membranes demonstrate high-temperature H2/O2 AEMFC operation at 100°C, with a peak power density of ~2 W cm−2 and durability over a 195-h period under a constant current density of 600 mA cm−2 with only ~4% voltage decay. This work illustrates an effective AEM design strategy through high-temperature operation to resolve water management issues, thereby improving AEMFC performance and durability.

Realizing Stable Perovskite Solar Cells with Efficiency Exceeding 25.6% Through Crystallization Kinetics and Spatial Orientation Regulation

Abstract

Organic-inorganic hybrid perovskites have emerged as highly promising candidates for photovoltaic applications, owing to the exceptional optoelectronic properties and low cost. Nonetheless, the performance and stability of solar cells suffer from the defect states of perovskite films aroused by non-optically active phases and non-centralized crystal orientation. Herein, a versatile organic molecule, Hydantoin, to modulate the crystallization of perovskite, is developed. Benefiting from the diverse functional groups, more spatially oriented perovskite films with high crystallinity are formed. This enhancement is accompanied by a conspicuous reduction in defect density, yielding efficiency of 25.66% (certified 25.15%), with superb environmental stability. Notably, under the standard measurement conditions (ISOS-L-1I), the maximum power point (MPP) output maintains 96.8% of the initial efficiency for 1600 h and exhibits excellent ion migration suppression. The synergistic regulation of crystallization and spatial orientation offers novel avenues for propelling perovskite solar cell (PSC) development.

Geometry-Sensitive Protrusion Growth Directs Confined Cell Migration

Johannes Flommersfeld, Stefan Stöberl, Omar Shah, et al.

Abstract

The migratory dynamics of cells can be influenced by the complex microenvironment through which they move. It remains unclear how the motility machinery of confined cells responds and adapts to their microenvironment. Here, we propose a biophysical mechanism for a geometry-dependent coupling between cellular protrusions and the nucleus that leads to directed migration. We apply our model to geometry-guided cell migration to obtain insights into the origin of directed migration on asymmetric adhesive micropatterns and the polarization enhancement of cells observed under strong confinement. Remarkably, for cells that can choose between channels of different size, our model predicts an intricate dependence for cellular decision making as a function of the two channel widths, which we confirm experimentally.

CHEMISTRY

Controlled dissolution of a single ion from a salt interface

Han, Huijun, Park, et al.

Abstract

Interactions between monatomic ions and water molecules are fundamental to understanding the hydration of complex polyatomic ions and ionic process. Among the simplest and well-established ion-related reactions is dissolution of salt in water, which is an endothermic process requiring an increase in entropy. Extensive efforts have been made to date; however, most studies at single-ion level have been limited to theoretical approaches. Here, we demonstrate the salt dissolution process by manipulating a single water molecule at an under-coordinated site of a sodium chloride film. Manipulation of molecule in a controlled manner enables us to understand ion–water interaction as well as dynamics of water molecules at NaCl interfaces, which are responsible for the selective dissolution of anions. The water dipole polarizes the anion in the NaCl ionic crystal, resulting in strong anion–water interaction and weakening of the ionic bonds. Our results provide insights into a simple but important elementary step of the single-ion chemistry, which may be useful in ion-related sciences and technologies.

Solvent effects in anion recognition

Patrick, Sophie C., Beer, et al

Abstract

Anion recognition is pertinent to a range of environmental, medicinal and industrial applications. Recent progress in the field has relied on advances in synthetic host design to afford a broad range of potent recognition motifs and novel supramolecular structures capable of effective binding both in solution and at derived molecular films. However, performance in aqueous media remains a critical challenge. Understanding the effects of bulk and local solvent on anion recognition by host scaffolds is imperative if effective and selective detection in real-world media is to be viable. This Review seeks to provide a framework within which these effects can be considered both experimentally and theoretically. We highlight proposed models for solvation effects on anion binding and discuss approaches to retain strong anion binding in highly competitive (polar) solvents. The synthetic design principles for exploiting the aforementioned solvent effects are explored.

A MOF-supported Pd1–Au1 dimer catalyses the semihydrogenation reaction of acetylene in ethylene with a nearly barrierless activation energy

Ballesteros-Soberanas, Jordi, Martín, et al.

Abstract

The removal of acetylene from ethylene streams is key in industry for manufacturing polyethylene. Here we show that a well-defined Pd1–Au1 dimer, anchored to the walls of a metal–organic framework (MOF), catalyses the selective semihydrogenation of acetylene to ethylene with ⩾99.99% conversion (⩽1 ppm of acetylene) and >90% selectivity in extremely rich ethylene streams (1% acetylene, 89% ethylene, 10% H2, simulated industrial front-end reaction conditions). The reaction proceeds with an apparent activation energy of ~1 kcal mol–1, working even at 35 °C, and with operational windows (>100 °C) and weight hourly space velocities (66,000mlgcat−1h−1) within industrial specifications. A combined experimental and computational mechanistic study shows the cooperativity between both atoms, and between atoms and support, to enable the barrierless semihydrogenation of acetylene.

BIOLOGY

Cancer SLC6A6-mediated taurine uptake transactivates immune checkpoint genes and induces exhaustion in CD8+ T cells

Tianyu Cao, Wenyao Zhang, Qi Wang, et al.

Abstract

Taurine is used to bolster immunity, but its effects on antitumor immunity are unclear. Here, we report that cancer-related taurine consumption causes T cell exhaustion and tumor progression. The taurine transporter SLC6A6 is correlated with aggressiveness and poor outcomes in multiple cancers. SLC6A6-mediated taurine uptake promotes the malignant behaviors of tumor cells but also increases the survival and effector function of CD8+ T cells. Tumor cells outcompete CD8+ T cells for taurine by overexpressing SLC6A6, which induces T cell death and malfunction, thereby fueling tumor progression. Mechanistically, taurine deficiency in CD8+ T cells increases ER stress, promoting ATF4 transcription in a PERK-JAK1-STAT3 signaling-dependent manner. Increased ATF4 transactivates multiple immune checkpoint genes and induces T cell exhaustion. In gastric cancer, we identify a chemotherapy-induced SP1-SLC6A6 regulatory axis. Our findings suggest that tumoral-SLC6A6-mediated taurine deficiency promotes immune evasion and that taurine supplementation reinvigorates exhausted CD8+ T cells and increases the efficacy of cancer therapies.

Formation of memory assemblies through the DNA-sensing TLR9 pathway

Jovasevic, Vladimir, Wood, et al.

Abstract

As hippocampal neurons respond to diverse types of information1, a subset assembles into microcircuits representing a memory2. Those neurons typically undergo energy-intensive molecular adaptations, occasionally resulting in transient DNA damage3,4,5. Here we found discrete clusters of excitatory hippocampal CA1 neurons with persistent double-stranded DNA (dsDNA) breaks, nuclear envelope ruptures and perinuclear release of histone and dsDNA fragments hours after learning. Following these early events, some neurons acquired an inflammatory phenotype involving activation of TLR9 signalling and accumulation of centrosomal DNA damage repair complexes6. Neuron-specific knockdown of Tlr9 impaired memory while blunting contextual fear conditioning-induced changes of gene expression in specific clusters of excitatory CA1 neurons. Notably, TLR9 had an essential role in centrosome function, including DNA damage repair, ciliogenesis and build-up of perineuronal nets. We demonstrate a novel cascade of learning-induced molecular events in discrete neuronal clusters undergoing dsDNA damage and TLR9-mediated repair, resulting in their recruitment to memory circuits. With compromised TLR9 function, this fundamental memory mechanism becomes a gateway to genomic instability and cognitive impairments implicated in accelerated senescence, psychiatric disorders and neurodegenerative disorders. Maintaining the integrity of TLR9 inflammatory signalling thus emerges as a promising preventive strategy for neurocognitive deficits.

Control of cell proliferation by memories of mitosis

Franz Meitinger, Hazrat Belal, Robert L. Davis, et al

Abstract

Mitotic duration is tightly constrained, and extended mitosis is characteristic of problematic cells prone to chromosome missegregation and genomic instability. We show here that mitotic extension leads to the formation of p53-binding protein 1 (53BP1)–ubiquitin-specific protease 28 (USP28)–p53 protein complexes that are transmitted to, and stably retained by, daughter cells. Complexes assembled through a Polo-like kinase 1–dependent mechanism during extended mitosis and elicited a p53 response in G1 that prevented the proliferation of the progeny of cells that experienced an approximately threefold extended mitosis or successive less extended mitoses. The ability to monitor mitotic extension was lost in p53-mutant cancers and some p53–wild-type (p53-WT) cancers, consistent with classification of TP53BP1 and USP28 as tumor suppressors. Cancers retaining the ability to monitor mitotic extension exhibited sensitivity to antimitotic agents.

Ⅲ Calling for papers

AERE 2024

Submission deadline: **May 30, 2024**
Conference date: **Oct 25, 2024 - Oct 27, 2024**
Full name: **2024 4th Asia Environment and Resource Engineering Conference (AERE 2024)**
Location: **Singapore**
Website: **http://www.aere.net/**

2024 4th Asia Environment and Resource Engineering Conference (AERE 2024) will be held during Oct. 25-27, 2024 in Singapore. AERE 2024 is one of the leading international conferences for presenting novel and fundamental advances in the fields of Environment and Resource Engineering. It also serves to foster communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in improvinga environment and resource engineering related techniques.

2024 4th Asia Environment and Resource Engineering Conference (AERE 2024) is the academic forum for the presentation of new advances and research results in the fields of theoretical, experimental, and applied Asia Environment and Resource Engineering Conference. The conference will bring together leading researchers, engineers and scientists in the domain of interest from around the world. Topics of interest for submission include, but are not limited to:

Environmental Ecological Engineering

- Ecosystem Management and Sustainable Development
- Global environmental change and ecosystems management
- Integrated ecosystems management
- Environmental restoration and ecological engineering
- Habitat reconstruction
- Biodiversity conservation
- Deforestation
- Wetlands
- Landscape degradation and restoration
- Soil decontamination
- Eco-technology
- Bio-engineering
- Geophysics
- Sustainable cities
- Environmental Monitoring and Management
- Health and the Environment

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- Health related organisms
- Hazardous substances and detection techniques
- Biodegradation of hazardous substances
- Toxicity assessment and epidemiological studies
- Management and regulation of point and diffuse pollution
- Monitoring and analysis of environmental contaminant
- Quality guidelines, environmental regulation and monitoring
- Public participation
- Economic instruments
- Modeling and decision support tools
- Institutional development
- Transboundary cooperation

Resources and Environment Engineering

- Water Resources Management and Water Pollution Control
- Hydrology
- Physical oceanography
- Ground water remediation
- Water resources and river basin management
- Regulatory practice, water quality objectives standard setting, water quality classification
- Ground water management
- Wastewater and sludge treatment
- Nutrients removal
- Suspended and fixed film biological processes
- Anaerobic treatment
- Process modelling
- Atmospheric science and air pollution control
- Atmospheric physics
- Meteorology
- Climate and climatic changes
- Global warming
- Ozone layer depletion
- Carbon capture and storage
- Biofuels
- Air pollution and control
- Emission sources
- Atmospheric modeling and numerical prediction
- Interaction between pollutants
- Control technologies
- Air emission trading
- Indoor air pollution
- Solid Waste Pollution Control and Resource Utilization
- Solid waste management
- Waste minimization
- Optimization of collection systems

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- Recycling and reuse
- Waste valorization
- Resource management
- Technical aspects of treatment and disposal methods (landfilling, thermal treatment etc)
- Leachate treatment
- Legal, economic and managerial aspects of solid waste management
- Management of hazardous solid waste

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ICBAE 2024

Submission deadline:	**May 20, 2024**
Conference date:	**Oct 9, 2024 - Oct 11, 2024**
Full name:	**2024 6th International Conference on Biotechnology and Agriculture Engineering**
Location:	**Tokyo, Japan**
Website:	http://www.icbae.org/

In the coming decades,the world food structure will face huge challenges to feed its large and growing population. The influence factors include on-going growth of the world population, the limited availability of natural resources and climate change. 2024 6th International Conference on Biotechnology and Agriculture Engineering, as one of the premier forum for presenting developments in the field, aimed to bring together leading scientists, researchers around the world to discuss the priority topics for Biotechnology and Food Science in recent years, will be held in Tokyo, Japan during October 9-11, 2024.

Authors are solicited to contribute to the conference by submitting articles that illustrate research results, projects, surveying works and industrial experiences that describe significant advances in the following areas, but are not limited to:

- Agricultural Biotechnology
- Agricultural Ergonomics
- Agricultural Production and Food Safety
- Agricultural systems
- Agricultural waste management
- Agro-industry
- Animal Agriculture in the Globe
- Animal Health & Welfare
- Animal Protein and fibre products
- Aquaculture and Biosystems Research
- Biological natural resource engineering
- Bio-machine systems
- Bioprocess and Biosystems
- Biotechnology for Livestock, Pests and Aquaculture
- Cutting Edge Science for Future Animal Agriculture
- Ecological Engineering
- Emerging public concerns with animal agriculture
- Emerging technologies in Agriculture and Livestock
- Energy in agriculture
- Environmental constraints to animal agriculture
- Food Engineering and biotechnology
- Food safety and Bio-process engineering
- Food security

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- Food Science and Technology
- Food traceability and safety
- GPS and GIS technologies
- Industry Transformation - Case Studies
- Livestock Biotechnology
- Livestock building design for animal welfare and health
- Livestock Production
- Mammary development and lactation - a vision for functional genomics
- Meat and allied industries
- Nanotechnology in agriculture
- Power and machinery in agriculture
- Precision farming and variable rate technology
- Research for improved animal fibre products
- Soil and water engineering
- Structures and environment
- Terramechanics
- The post-genomic future for genetic selection of livestock
- Traceability of animal source foods

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ACEEP 2024

Submission deadline: **Jun 20, 2024**
Conference date: **Nov 9, 2024 - Nov 11, 2024**
Full name: **2024 Asia Conference on Environmental Economics and Policy**
Location: **Osaka, Japan**
Website: https://aceep.net/

2024 Asia Conference on Environmental Economics and Policy (ACEEP 2024), will be held in Osaka, Japan during November 9-11, 2024 as a workshop of ACESD. It is sponsored by iNehc, IJESD and technically supported by Yokohama National University, National Institute for Environmental Studies, Nagasaki University and Japan International Cooperation Agency.

It aims to provide a forum for researchers, practitioners, and professinals from the industry, academia and government to discourse on research and development, professional practice in new enery and applications. The conference serves to foster communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in improving new energy technology and related techniques. It also brings authors and readers together to communicate face to face and discuss chances for possible cooperation and hot topics in the field of environmental economics and policy.

Authors are invited to submit full papers describing original research work in areas including, but not limited to:
Environmental Policies, Planning and Management
Ecosystem Services and Management
Economic Instruments for Water, Manufacturing and Energy Sectors
Market Failure Including Externalities, Non-excludability and Non-rivalry
Cost-benefit and Cost-effectiveness Analyses
Modeling and Simulation
Institutional Arrangements
Resource Pricing / Economic Valuation of Environmental Goods
Indicators of Environmental Quality
Environmental Econometrics and Methodological Issues
Environmental Performance
Decision-making in Environmental Protection
Climate Change Economics / Climate Policy

Sustainable Development
Green Economics
Environmental economics
Natural resources and environmental issues
Analysis of environmental policy
Further development of valuation techniques and novel applications
Environmental behavior and responses to regulation
Analyses of exhaustible, renewable and non-renewable resources and resource policy

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Analyses of the carbon cycle, accumulating pollutants, such as greenhouse gases
Environmental problems in developing countries
Degradation of natural resources and health problems caused by pollution
Topics of energy economics related to the environment
Topics of agricultural economics related to the environment

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ICESR 2024

Submission deadline:	**May 5, 2024**
Conference date:	**Aug 20, 2024 - Aug 22, 2024**
Full name:	**2024 10th International Conference on Environmental Systems Research**
Location:	**Rome, Italy**
Website:	http://www.icesr.org/

Welcome your participation and contribution to the 2024 10th International Conference on Environmental Systems Research (ICESR 2024) to be held in Rome, Italy during August 20-22, 2024

In the recent decades, the world Environmental Systems are facing huge challenges. The influence factors include on-going growth of the world population, the limited availability of natural resources and climate change. Based on the background, International Conference on Environmental Systems Research, as one of the premier forum for presenting developments, aimed to bring together leading scientists, researchers around the world to discuss the priority topics for the conference in recent years

The conference programme will include prominent keynote speakers, plenary speakers, invited speakers and regular paper presentations in parallel tracks. The General Chairs, along with the entire team cordially invite you to submit your latest research results and to take part in the upcoming conference.

The 2024 10th International Conference on Environmental Systems Research is a premier forum for the presentation of technological advances and research results in the fields of Environmental Systems Research. Call for paper topics for ICESR 2024 include - but they are not limited to - the following areas of science:

- Environmental Management

Effect of traditional and emerging contaminants in the environments
Monitoring, analysis, prevention, treatment and remediation methods and techniques
Modeling methods and applications related to assessment, simulation, optimization and management of resources, environmental and ecological systems
Environmental impact and risk assessment, uncertainty analysis, vulnerability/resilience assessment, and life cycle analysis
Ecotoxicology, environmental health and safety
Environmental biotechnology, microbiology, and genomics
New material and nanotechnology and their environmental applications
Cleaner production, green chemistry, and resource-oriented waste management
Water resources and watershed modeling, storm water management, and flood/draught control
Climate change impact assessment and adaptation planning
Environmental sustainability, circular economy, and asset management
Environmental decision making, policy, legislation and governance
Health and the Environment

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Health related organisms
Hazardous substances and detection techniques
Biodegradation of hazardous substances
Toxicity assessment and epidemiological studies
Management and regulation of point and diffuse pollution
Monitoring and analysis of environmental contaminant
Quality guidelines, environmental regulation and monitoring
Public participation
Modeling and decision support tools
Institutional development
Transboundary cooperation

- Environmental Sustainable Development

Global environmental change and ecosystems management
Integrated ecosystems management
Environmental restoration and ecological engineering
Habitat reconstruction
Biodiversity conservation
Deforestation
Wetlands
Landscape degradation and restoration
Soil decontamination
Eco-technology
Bio-engineering
Geophysics
Satellite applications in the environment
Environmental sustainability
Life cycle analysis
Environmental systems approach
Renewable sources of energy-energy savings
Clean technologies
Sustainable cities

- Water Resources Management and Water Pollution Control

Hydrology
Physical oceanography
Ground water remediation
Water resources and river basin management
Regulatory practice, water quality objectives standard setting, water quality classification
Ground water management
Wastewater and sludge treatment
Nutrients removal
Suspended and fixed film biological processes
Anaerobic treatment

- Atmospheric science and air pollution control

Atmospheric physics

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Meteorology
Climate and climatic changes
Global warming
Ozone layer depletion
Carbon capture and storage
Biofuels
Air pollution and control
Emission sources
Atmospheric modeling and numerical prediction
Interaction between pollutants
Control technologies
Air emission trading
Indoor air pollution

- Solid Waste Pollution Control and Resource Utilization

Solid waste management
Waste minimization
Optimization of collection systems
Recycling and reuse
Waste valorization
Resource management
Technical aspects of treatment and disposal methods (landfilling, thermal treatment etc)
Leachate treatment
Legal, economic and managerial aspects of solid waste management
Management of hazardous solid waste

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