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Message from the Editor-in-Chief

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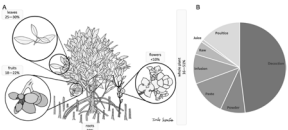
Section Ecology Science and Engineering

Featured Papers

DOI:10.3390/app12157493

Halophytes as Medicinal Plants against Human Infectious Diseases

Authors: Maria João Ferreira, Diana C. G. A. Pinto, Ângela Cunha and Helena Silva

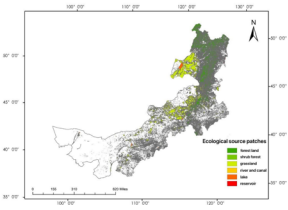


Abstract: Halophytes have long been used for medicinal purposes. However, for many decades, their use was entirely empirical, with virtually no knowledge of the bioactive compounds underlying the different applications. In recent decades, the growing problem of antibiotic resistance triggered the research on alternative antimicrobial approaches, and halophytes, along with other medicinal plants, regained attention as an underexplored pharmacological vein. Furthermore, the high nutritional/nutraceutical/pharmacological value of some halophytic species may represent added value to the emerging activity of saline agriculture and targeted modification of the rhizosphere, with plant-growth-promoting bacteria being attempted to be used as a tool to modulate the plant metabolome and enhance the expression of interesting metabolites. The objective of this review is to highlight the potential of halophytes as a valuable, and still unexplored, source of antimicrobial compounds for clinical applications. For that, we provide a critical perspective on the empirical use of halophytes in traditional medicine and a state-or-the-art overview of the most relevant plant species and metabolites related with antiviral, antifungal and antibacterial activities.

DOI:10.3390/app12104872

Study on the Structural Properties of an Ecospatial Network in Inner Mongolia and Its Relationship with NPP

Authors: Xiaoci Wang, Ruirui Wang, Qiang Yu, Hongjun Liu, Wei Liu, Jun Ma, Teng Niu and Linzhe Yang

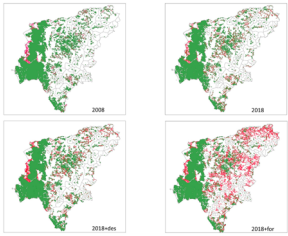


Abstract: In the context of strengthening the construction of ecological civilization and accelerating the “carbon peak” in China, the regional ecological pattern and its connection with carbon sink capacity have become an urgent topic. Given that Inner Mongolia is a large carbon emission province and the conflict between economic development and ecological protection is particularly prominent, we took Inner Mongolia as an example to extract its ecospatial network, then calculated the integrity index, topological indices, and recovery robustness of the network and evaluated integrity and other properties of the ecospatial network structure by combining them with the ecological background. In addition, we analyzed the relationship between the topological indices and net primary productivity (NPP). The results showed that the network was scale-free and heterogeneous, with low integrity, connectivity and stability, which were the focus of future optimization. The nodes with important functions were mainly distributed in the farm-forest ecotone, grasslands, and the agro-pastoral ecotone; under the simulation attack, the node recovery robustness was stronger than the corridor recovery robustness, and NPP was negatively and significantly correlated with the woodland nodes and grassland nodes. In terms of ecological restoration, the unused land in the west is a key area, and it is necessary to add new ecological nodes and corridors. In terms of enhancing carbon sequestration capacity, under the premise of ensuring network connectivity, the appropriate and rational merging of ecological nodes and corridors within woodlands and grasslands is a particularly effective means. This study provides a reference for evaluating and optimizing the ecological pattern of areas with prominent ecological problems and improving the carbon sink of ecosystems in terms of their ecospatial network structure.

DOI:10.3390/app13116418

Forest Plantations in Manabí (Ecuador): Assessment of Fragmentation and Connectivity to Support Dry Tropical Forests Conservation

Authors: Alex J. Quimis Gómez, Carlos A. Rivas, Pablo González-Moreno and Rafael M. Navarro-Cerrillo

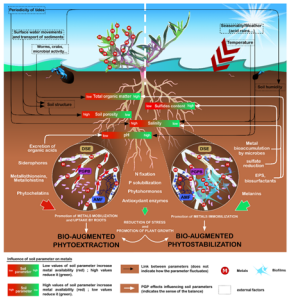


Abstract: In many tropical regions, national forests plantation programs have been promoted. Those plantations frequently contribute to habitat changes. However, the associated effects of forest plantations on habitat fragmentation and landscape connectivity are unclear. From 2008 to 2018, we examined land use changes, plantations, and deforestation of the Manabí province (Ecuador) provided by the Ecuadorian Ministry of the Environment. Four scenarios were created: (i) land uses in 2008, (ii) land uses in 2018, (iii) land uses in 2018 without deforestation, and iv) land uses in 2018 including reforestation. Fragmentation and connectivity metrics were analyzed using ArcGisPro and Graphad 2.6 software, respectively. *Puma yagouaroundi* was selected as the reference species. At regional scale, forest plantations had a significant effect on land uses changes and fragmentation during the study period. Forests decreased from 33.7% to 32.4% between 2008 and 2018, although other natural land uses, mostly those involving shrubs, increased by almost double (from 2.4% to 4.6%). Most of the deforestation affected native forests during this period, and most reforested areas in 2018 covered former agricultural land. Fragmentation decreased in the number of patches and increased in the average patch size. When considering reforestation, deforestation was higher than the reforested area (58 km^2 of difference), increasing the number of patches but with smaller size. Reforestation increased connectivity with a higher number of links and distance, particularly in central and extreme northeast areas of Manabí province. The scenario without deforestation also increased connectivity for *Puma yagouaroundi* in the west part of the Manabí province. Our findings suggest that forest plantations contribute to forest conservation by increasing the connectivity between fragmented patches.

DOI:10.3390/app13074228

Potential of Halophytes-Associated Microbes for the Phytoremediation of Metal-Polluted Saline Soils

Authors: Pauline Bonaventure, Linda Guentas, Valérie Burtet-Sarramegna and Hamid Amir



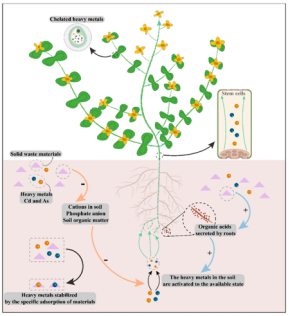
Abstract: Saline ecosystems are often the target of spills and releases of pollutants such as metals, as many industrial companies settle in or around these areas. Metal pollution is a major threat for humans and ecosystems. In line with sustainable development, nature-based solutions and biological tools such as phytoremediation offer eco-friendly and low-cost solutions to remove metals or limit their spread in the environment. Many plant-growth-promoting (PGP) effects are frequently prospected in plant-associated microbes such as the production of auxins, siderophores, or extracellular polymeric substances to enhance phytoremediation. Halophytes are nowadays presented as good phytoremediators for metal-contaminated saline environments such as coastal regions, but little is known about the potential of their associated microbes in the bioaugmentation of this technique. Here, we review the studies that focused on halophytes-associated microbes and their plant-growth-promotion capacities. Moreover, we discuss the limitation and applicability of bioaugmented phytoremediation in saline ecosystems.

DOI:10.3390/app13095695

Combined Remediation Effects of Pioneer Plants and Solid Waste towards Cd- and As-Contaminated Farmland Soil

Authors: Jiamei Wu, Chenxu Zhang, Huifen Yang, Pan Chen and Jian Cao

Abstract: The development of phytoremediation technology is constrained by gentle phytoextraction efficiency and slow biomass accumulation. In this study, a combined remediation of pioneer plants and solid waste towards Cd- and As-contaminated farmland soil was explored. Pioneer plants *Cynodon dactylon* and two material formulas (Steel slag (SS):pyrolusite (PY):ferrous sulfide (FS) = 3:3:2 or 1:2:8) were used in pot experiments. The DTPA method was used to extract the bioavailable heavy metals from soil, and then, the reduction rates of the bioavailable heavy metals were calculated. After harvesting plants, data of moisture content, biomass, root length and plant height were obtained. The remediation effect was evaluated according to the above indexes. The experimental results showed that the remediation effect of *Bidentis pilosa* was better than that of *Cynodon dactylon*. The addition of solid waste material significantly reduced the content of bioavailable Cd and As in soil by 97.73% and 53.54%, respectively. Suitable wastes may be a potential addition to heavy metal contaminated soils to promote phytoremediation of heavy metals.



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