Emergent horizons and biodynamic interactions

James Nicholas Furze^{1,2,3} · El Hassan Mayad²

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Editorial

Emergent horizons and biodynamic interactions occur within extremes of biological diversity, chemical potential in soil and atmospheric/climatic parameters, and social inclusion. These give us the definitions required for geographical partitioning of lands to enable the highest protection advisory of the United Nations Educational, Scientific and Cultural Organization (UNESCO) bordering bodies. The international treaty of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, formed in 1954, links UNESCO sites as being crucial to national sustainable development. Sustainable development benefits international industry links with a diverse range of natural product potential. The papers presented in this special edition arose following a call for sessions entitled “Horizons – the good, bad and ugly of extreme geographical borders,” which were held during the Royal Geographical Society (with the Institute of British Geographers) Annual International Conference 2021 under the theme of “Borders, borderlands and bordering.”

Contributions to the special issue detail pivotal elements which maintain ecological and social structures, in Morocco, Iran, and on a wider, global scale. Biological strategies, genetic interactions and different physiological growth forms generate ecological tapestries. We approach functions that assist in

defining eco-types, transitions through life-forms and feeding types crucial to evolution in extreme settings and their gradients. Interactions between different life-groups and calculations of agro-ecological diversity provide complements, ensuring diversity within trophic levels. Successful and efficient dosage of biological treatments and chemical application make best use of biological interaction potentials, and avoid chaotic pollution (in chemical, hydrological, and atmospheric terms). Biological applications are fundamental to sustainable/organic agriculture pattern formation. Waste management of organic processes must be carried out in order to minimize pollution and facilitate water relations in drought stricken countries for rehabilitation of ravaged habitats. Morocco is home to an incredible diversity of natural produce, nurturing national populations and stimulating trade with neighboring countries. The diversity encompasses food, medicinal, and nutraceutical species, which are present; their cultivation and ecosystem interactions facilitate ecosystem range. We conclude by reflecting biological diversity and ecosystem services/management of the UNESCO Arganeraie Biosphere (South-Western region of Morocco). This area promotes development of the entire country, with a range of diversity, ecosystem types, a number of dispersed populations, and rural communities who benefit from agricultural and ecological opportunities that the region provides.

The article, “Harmonics, evolutionary generators, DANCE and HEAR-functional dimensions” (Furze and Mayad 2021a), details evolution over the last four billion years. Studies of the process comprise different fields of study with perspectives of biology, chemistry, physics, biochemistry, and astrobiology. The paper includes cellular and molecular life systems formation and proliferation; techniques to partition and create variance in mathematic terms; Fisher genetics key to natural selection; climatic, terrestrial, and organic extremes; Laplacian expressions giving summary of differential algorithmic network centered emergence (DANCE); evolutionary harmonics and generators; laboratory and field data identified example species enforcing the ternary groupings of evolution; emergence, strategies, and functions in life and harmonic evolutionary algorithmic resilience (HEAR) enabling binary (passive and

Responsible Editor: Philippe Garrigues

✉ James Nicholas Furze
james.n.furze@gmail.com; jamesfurze@hotmail.com

¹ Royal Geographical Society (with the Institute of British Geographers), 1 Kensington Gore, London SW7 2AR, UK

² Laboratory of Biotechnology and Valorization of Natural Resources, Faculty of Sciences of Agadir, Department of Biology, Ibn Zohr University, BP 8106, 80000 Agadir, Morocco

³ Control and Systems Engineering Department, University of Technology-Iraq, P.O. Box 19006, Alisinaah Street, Baghdad 10066, Iraq

active) consideration of all life on Earth. Furze and Mayad (2021b) gives a developed transpose of the evolutionary generator. Furze and Mayad (2021a) additionally considers potential futures for Earth amidst anthropogenic and variable forcing factors.

The article “Phytoparasitic nematodes of organic vegetables in the Argan Biosphere of Souss-Massa (Southern Morocco)” (Filali Alaoui et al. 2021) reveals that agroecological productivity is limited by the wide spread and dynamics of plant parasitic nematodes (PPN). Conventional control methods of PPN are inadequate and have persistent harmful effects. Organic vegetable soils in Souss-Massa were nematologically sampled, and assessment of taxonomic proliferation was made in relation to host species, geographical origin, and climatic and micro-climatic factors. Obligate and facultative plant feeders were identified. Taxonomic diversity of nematodes increased across the sampled area. Soil texture, organic matter, pH, nitrogen, zinc, magnesium, copper, altitude, and humidity and temperature were seen as driving roles in the abundance, distribution, and community structures of nematodes. Edaphic and climatic variables affect nematode populations greatly. A combination of biological treatments and agroecological practices restricting important economic PPN growth and enhancing soil quality are required to achieve sustainable management.

The article “Optimization of tomato waste composting with integration of organic feedstock” (Tabrika et al. 2021) focuses on the valorization of organic waste into organic supplements. To overcome limits on composting imposed by physicochemical characteristics of tomato waste, different mixtures were investigated using olive pumice, sheep manure, chicken manure, and sawdust. The type and ratio of feedstock of the mixtures affected the temperature and quality of composting in terms of nutriment, organic matter, and humic substances. Olive pumice increased humic acid-like carbon and fulvic acid-like carbon. Using sheep manure was seen to be more efficient than chicken manure. The article strongly advocates cooperation of agronomic and animal farm sectors.

The article, “Water purification plantations for oil and gas industries in Iran” (Parnian et al. 2021), demonstrates an improvement in water treatment required for extremely polluted waters produced by extractive industries of oil and gas. Novel structures were designed and constructed at minimal cost. Cyclonic ponds produced a vortex with a settled material outlet, water outlet, and a pumped shower system which enabled removal of sludge without mechanical intervention. Following aeration, biological, and chemical treatment, total suspended solids reduced by 98% and improvements were seen in absorbance, dissolved organic carbon, and turbidity. The pond design was seen to be an improvement on other designs and was economically priced with short construction time. Furthermore, the constructed systems are highly adaptable and may also provide solutions in additional extractive, polluting industries. Water quality improvement shows the value of these plantations, for human consumption, utility, and ecosystem

services amidst extensive pollution caused by oil, gas, and other polluting industries.

The article “Vertical phytoremediation of wastewater using *Vetiveria zizanioides* L.” (Parnian and Furze 2021) provides a solution to the remediation of wastewater, using a highly efficient approach of vertical agriculture plant cultures. Vetiver grass was used in increasing wastewater flow rate instances and assessments of purity were carried out. A reduction of biochemical oxygen demand and nitrate content, and an increase in electrical conductivity and dissolved oxygen was found in outlet water. The performance of the vertical wastewater phytoremediation efficiently remediated polluted wastewater. A scaling up of the methods using vetiver and alternative competitive plants holds great promise for wastewater remediation, enhancing both human and ecosystem service water supply and demand.

The article, “Floristic biodiversity, biogeographical significance, and importance of Morocco’s Arganeraie Biosphere Reserve” (Msanda et al. 2021), discusses coastal and sub-coastal areas of west-central Morocco, the southern part of the western High Atlas mountains, northern and the southern slopes of the western Anti-Atlas, where vegetation is characterized by a typical infra-Mediterranean type. The Arganeraie Biosphere Reserve is among the most important borderlands of North Africa. The flora is determined by complex historical and environmental factors which occurred since the tertiary period. Key species enabling originality of this sector include the argan tree (*Argania spinosa*), the Moroccan gum tree (*Acacia gum-mifera*), the olive tree (*Olea europaea* subsp. *maroccana*), and a thermophilic flora adapted to a particularly arid climate. There are many endemic species (including *Dracaena draco* subsp. *draco*, *Hesperolaburnum platycarpum*, *Genista ferox* subsp. *microphylla*, and *Bupleurum dumosum*). Flora in this Biosphere Reserve constitutes the final barrier against the desert and is of environmental and socio-economic interest. Wood is used for fuel, leaves and fruits are used as forage. Argan fruits are collected for oil with nutritional, cosmetic, and medicinal properties. Additionally, other endemic species are used in medicine and cosmetics. The argan region was declared a UNESCO Biosphere Reserve in 1998, however it is becoming desolated as a consequence of increasing clearing, overgrazing, and over exploitation. The area represents a high conservation priority for sustainable management strategies for species and genetic diversity which ranges across northern Africa and beyond.

Oral and extended presentation, showing implementation of select research included in the special issue, is available by direct contact to the first guest editor and to contributing authors. We would like to thank all of the contributing authors, for their exceptional and timely contributions. The guest editors are also grateful to the Royal Geographical Society (with the Institute of British Geographers) for hosting the conference in which select articles of this issue were presented.

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James Nicholas Furze James Nicholas Furze received his BSc in Botany from the University of Wales, Aberystwyth, and MSc in Applied Genetics from the University of Birmingham, UK. He received his PhD in Engineering Design and Mathematics, Geography, and Environmental Management from the University of the West of England, UK. He has publications in geographical, molecular, biological, and chemical as well as in applied

mathematics, control, and computational areas. He collaborates globally including with South America, Ecuador, and China, Africa, Egypt, and India and is a Fellow of the Royal Geographical Society, London, also of the Control and Systems Engineering Department, University of Technology-Iraq, Baghdad, and of the Laboratory of Biotechnologies and Valorization of Natural Resources, University of Ibn Zohr, Agadir, Morocco. James is actively involved in community and advisory in plant resources, risk mitigation, and biodiversity enrichment. His research interests include both multi-disciplinary and refined approaches within biological and climate sciences, genetics, chemistry, sustainability, mathematics, optimization, intelligent control, and computer science. Current research efforts stimulate serial characterization approaches of different life forms and validation of existing and future potential of natural resources, with a view to minimizing impact on trophic patterns which ultimately beget diversity and its proliferations.

El Hassan Mayad El Hassan Mayad received his BSc in Techniques of Plant Production and Breeding from the Faculty of Science and Technology of Beni-Mellal, Cadi Ayad University. He moved to University of Ibn Zohr in Agadir where he prepared his MSc in Plant Biotechnology and PhD in Crop Sciences (minor Plant Nematology), within a fruitful collaboration with the Agronomic and Veterinary Institute of Agadir. After a successful starting career as a Teacher of Life and Earth Sciences, the Faculty of Sciences—Agadir engaged him in a permanent position as an Assistant Professor in Plant Sciences. He participated in several international training courses and collaborated as a visiting scholar on nematology projects in the USA, Netherlands, France, and Italy. He is one of the top nematologists in Morocco and is a prolific publisher. His publications include several refereed papers across a wide range of topics. Now, he is an Associate Professor in agroecology and bioaggressors management. His recent research focuses on ecology of nematodes and other emerging bioaggressors with integration of cutting edge technology in order to discover and develop innovative agroecological tools and methods for sustainable management of emerging bioaggressors in fruit and vegetable agroecosystems.