

5th CERES INTERNATIONAL CONFERENCE (SES2019)

**Social-Ecological Systems - From Risks and
Insecurity to Viability and Resilience**

Organized by

**The Research Center for Environment, Human Security
and Governance (CERES)**



THE CONFERENCE PROGRAM

October 24-25, 2019
Le Samiramis Hotel, Marrakech, Morocco

SES2019 PROGRAM AT GLANCE

THURSDAY, OCTOBER 24 | JEUDI 24 OCTOBRE

8.00-9.00: Delegate Registration | Inscriptions des participants


9.00-9.40: Opening session	13.00-14.30: Lunch
9.40-11.10: Plenary session 1	14.30-16.00: Plenary session 3
11.10-11.30: Coffee break	16.00-16.20: Coffee break
11.30-13.00: Plenary session 2	16.20-18.00: Plenary session 4


FRIDAY, OCTOBER 25 | VENDREDI 25 OCTOBRE

9.00-10.30: Plenary session 5	14.00-15.30: Plenary session 7
10.30-10.50: Coffee Break	15.30-15.50: Coffee Break
10.50- 12.30: Plenary session 6	15.50-17.00: Roundtable
12.30-14.00: Lunch	17.00-17.20: Closing session

Conference homepage

 <https://www.ceres-center.org/ses2019>

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 <https://www.ceres-center.org/ses2019?lang=ar>

SES2019 BOARDS

STEERING BOARD

Dr. Mohamed Behnassi	SES2019 Chair, Researcher & Professor, Faculty of Law, Economics and Social Sciences, Ibn Zohr University of Agadir and Director of CERES, Morocco
Dr. Fatima Arib	Researcher & Professor, Faculty of Law, Economics and Social Sciences, Cadi Ayyad University of Marrakech and Researcher at CERES, Morocco
Dr. Rachida El Morabet	Associate Professor, Faculty of Arts and Human Sciences, Hassan II University of Mohammedia; Researcher at CERES, Morocco
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Dr. Halima Ouamouch	Associate Professor, Faculty of Arts and Human Sciences, Hassan II University-Ain Chock of Casablanca; Researcher at CERES, Morocco
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Mohamed Zahour	PhD Student, Ibn Zohr University of Agadir, Morocco
Rabaa Bourhim	PhD Student, Ibn Zohr University of Agadir, Morocco

SCIENTIFIC BOARD

Dr. Mahjoub El Haiba	Researcher & Professor, Ex-Inter-Ministerial Delegate for Human Rights, Member of the National Human Rights Council, Morocco
Dr. Michael R. Reed	Researcher Professor of Agricultural Economics. Director, International Programs for Agriculture, University of Kentucky, USA
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Dr. Rachida El Morabet	Associate Professor, Faculty of Arts and Human Sciences, Hassan II University of Mohammedia; Researcher at CERES, Morocco
Dr. El Houcine Chougrani	Professor, Faculty of Law, Economics and Social Sciences, Cadi Ayyad University of Marrakech, Morocco
Dr. Ajmal M. Qureshi	Senior Associate, Asia Center, Faculty of Arts and Sciences, Harvard University, USA
Dr. Juhn Pulhin	Professor, College of Forestry and Natural Resources, University of the Philippines, Los Baños College, Philippines
Dr Ziani Aboulkasem	Researcher Professor, Faculty of Arts and Human Sciences, Cadi Ayyad University of Marrakech, Morocco

Background

One of the most striking dynamics of the Anthropocene Era is the ability of anthropogenic processes to interact with ecological systems on a large scale and at a rapid rate, with greater intensity and uncertain consequences. Human societies have managed to build many forms of disconnected environments to meet a myriad of needs – which are not usually considered as fundamental to the survival and development of human species – while crossing many ecological thresholds, sometimes irreversibly. The failure to perceive these societies as part of the Earth System (Geosphere, Atmosphere, Biosphere, and Hydrosphere), and act accordingly, is increasingly associated with the emergence of interdependent and complex risks – that are mostly global in scope and unprecedented in scale – affecting the security, viability and resilience of both social and ecological systems at all levels. This, in turn, continuously unveils our incapacity to efficiently manage these risks and crises by using the same value systems, which are the main cause of their emergence.

Failure to mitigate and adapt to climate change, biodiversity loss, man-made environmental disasters, and the collapse of many ecosystems represent, among others, the chief risks to social systems. These risks affect, among others, food and health systems, socio-economic development, and political integration with many implications for livelihoods, well-being, productivity, and even regional and domestic security. Similarly, many risks affecting social systems, such as poverty, hunger, conflicts, displacements, injustice, inequalities, etc. are increasingly induced by ecological systems' dynamics, especially environmental and climatic changes. As it is recently expressed, of all the risks to the globe, it is in relation to the environment that the world is most clearly sleepwalking into catastrophe.

For illustration purposes, the current global food system – as a Social-Ecological System – is highly impacted by biodiversity loss and climate change

through changes in temperature, precipitation, extreme weather events, and sea-level rise. In the meantime, the global food system is a major driver of biodiversity loss and climate change given its higher carbon emissions, depletion of freshwater and land resources, increased pollution of aquatic and terrestrial ecosystems, deterioration of public health, increased mortality and animal suffering. The way we produce and consume food, especially in Northern and the so-called emerging countries, is increasingly considered as a human and environmental disaster. Scientists predict that within the coming decades, the ecological, climatic and health challenges of the global food system could dramatically increase in the absence of appropriate response mechanisms, reaching levels beyond the planetary boundaries that define a safe operating space for humanity. It was also shown that options for reducing the negative environmental and health effects of the food system, while meeting increasing food demands sustainably, need to be implemented simultaneously and in an integrated way according to innovative conceptual and policy frameworks.

Such dynamics urgently press us to rethink the nature of interaction between social and ecological systems from different perspectives and new paradigms. The social systems currently bear the main responsibility to change their relationship with the ecological systems, given the available capacities (i.e. knowledge, technology, power of action) that can be mobilized to reverse destructive trends. The shifts to be made should cover all aspects of interaction between the two systems such as: the integration and restructuring of governance frameworks (multilevel norms, actors, values and deliberations...) from a social-ecological system perspective; the reorganization of production and consumption systems far from the growth model and consumerism; the elaboration of mitigation, adaptation, and SDGs implementation measures while reinforcing the resilience and viability of a social-ecological system; and the consideration of appropriate

approaches and paradigms while elaborating and implementing response mechanisms (such as the gender approach, human rights and human security, socio-ecosystem approach, etc.).

Approach & Objectives

The 5th International Conference (SES2019), as a part of a series of events organized by CERES since 2009, is an opportunity to deepen the debate about social-ecological systems (SES). The approach consists of: assessing the structural drivers of vulnerability, crises and insecurity of SES; identifying areas of integration and synergy given the interdependence of SES; assessing the ability and inability of existing response mechanisms (governance frameworks, conceptual referential, cultural patterns and values...) to foster the resilience and viability of SES; and promoting approaches and ways of action to reverse undesirable trends.

Speakers from different perspectives and countries are provided the opportunity to present their research, insights, and successful

practices, and explore innovative options to guide future processes of change with regard to the resilience and viability of SES. The key topics are multidisciplinary in order to enable a fruitful interactions between numerous scientific disciplines, and relevant to policy-making processes, in order to enable a dialogue among researchers, experts, practitioners and decision-makers from different scales and spheres.

Key Tracks

- Identification of structural drivers of vulnerability, crises and insecurity affecting SES.
- Interdependence of SES: areas of integration and synergy.
- SES through the gender lens and environmental humanities
- Identification and assessment of existing response mechanisms from emerging approaches and paradigms
- Shifts to be made to foster the viability and resilience of SES

PROGRAM

THURSDAY, OCTOBER 24 (*morning*) | JEUDI 24 OCTOBRE (*matin*)

REGISTRATION OF DELEGATES. | INSCRIPTIONS DES PARTICIPANTS | 8.00-9.00

OPENING SESSION | SESSION D'OUVERTURE | 9.00-9.40

- **Mohamed Behnassi**, *Conference Chair, Founding Director of CERES, Researcher & Professor, Faculty of Law, Economics and Social Sciences, Ibn Zohr University of Agadir, Morocco*
- **Mahjoub El Haiba**, *Researcher & Professor, Ex-Inter-Ministerial Delegate for Human Rights, Member of the National Human Rights Council, Morocco*
- **Fatima Arib**, *Secretary General of CERES, Researcher & Professor, Faculty of Law, Economics and Social Sciences of Marrakech, Maroc*

PLENARY SESSION 1 | SESSION PLÉNIÈRE 1 | 9.40-11.10

Moderator: Mahjoub El Haiba, *Ex-Inter-Ministerial Delegate for Human Rights, Member of the National Human Rights Council, Morocco*

Environmental and Climate-Induced Conflicts and their Impacts on Social-Ecological Systems (SES): Implications for the Military in the Struggle for Life

Fred Kruidbos (*Biologist-Ecologist, Kruidbos Ecological Services, The Netherlands*)

A Social and Ecological System in the Arctic in Connection to Human Security: A Reference to Indigenous Communities and their Food System

Kamrul Hossain (*Research Professor & Director of the Northern Institute for Environmental and Minority Law, Arctic Centre, University of Lapland, Finland*)

Antarctica, Tourism, Risk and Vulnerability

Jane Verbitsky (*Researcher & Professor, School of Social Sciences and Public Policy, Auckland University of Technology, New Zealand*)

Pro-Environmental Behaviour and Social Trust

Ian Alcock (*Researcher, European Centre for Environment & Human Health, University of Exeter, UK*)

DISCUSSION

Coffee break | Pause-café | 11.10-11.30

PLENARY SESSION 2 | SESSION PLÉNIÈRE 2 | 11.30-13.00

Moderator: Ian Alcock, *Researcher, European Centre for Environment and Human Health, University of Exeter, United Kingdom*

The Current and Future Role of Agriculture in Global Greenhouse Gas Emissions

Michael R. Reed (*Researcher & Professor of Agricultural Economics & Director of the International Programs for Agriculture, University of Kentucky, USA*)

Les promesses d'une nouvelle approche économique dans la perspective d'un effondrement global – L'économie symbiotique comme horizon

François Cadoux (*Professeur, École Supérieure des Arts Visuels de Marrakech, Maroc*)

Enhancing Resilience for Food and Nutrition Security within a Changing Climate

Mohamed Behnassi, Rahman Mohammed Aatur, Joyce D'Silva, Gopichandran Ramachandran, Himangana Gupta, Olaf Pollmann, and Nira Ramachandran (*Researcher & Professor, Faculty of Law, Economics and Social Sciences, Ibn Zohr University of Agadir, Founding Director of CERES, Morocco*)

Health Safety as a Challenge for the Resilience and Viability of Social-Ecological Systems (SES)

Rachida El Morabet, Mohamed Behnassi, Said Mouak, Roohul Abad Khan, Abderrahmane Adoui El Ouadrhiri, Moustafa Ouadrim, Mohammed Aneflouss (*LADES Lab., Faculty of Arts and Humanities of Mohammedia, Hassan II University of Casablanca, CERES, Morocco*)

DISCUSSION

Lunch | Déjeuner | 13.00-14.30

THURSDAY, OCTOBER 24 (*afternoon*) | JEUDI 24 OCTOBRE (*après-midi*)

PLENARY SESSION 3 | SESSION PLÉNIÈRE 3 | 14.30-16.00

Moderator: Michael R. Reed, *Researcher & Professor of Agricultural Economics & Director of the International Programs for Agriculture, University of Kentucky, USA*

Social-Ecological Systems Resilience: At the Limits of Hegemonic Masculinity

Manuku Mukoni (*Midlands State University Gender Institute, Zimbabwe*)

Gendered Perspective: Climate Change Adaptation Strategy in Malawi

Linus Agbleze (*Researcher, United Nations University and University of Bonn, Germany*)

Resilience Building Initiatives to Counter Shocks and Stressors Affecting Rural Communities in Chiredzi District, Zimbabwe

Defe Rameck, Matsa Mark (*Midlands State University, Zimbabwe*)

Using Impact Chains to Understand Multi-Hazard Risk in the Marrakech-Safi region, Morocco: A Participatory Tool to Support Risk Assessment in Socio-Ecological Systems

Davide Cotti (*Researcher, United Nations University (UNU), Institute for Environment and Human Security (UNU-EHS), Germany*)

The Eco-Schools Experience in Environmental and Sustainability Education

Laila Bouziane (*Ph.D Student, Universidad de Sevilla, Spain*)

DISCUSSION

Coffee break | Pause-café | 16.00-16.20

PLENARY SESSION 4 | SESSION PLÉNIÈRE 4 | 16.20-18.00

Moderator: Berrichi Mohamed, *Laboratoire de la Gestion Conservatoire de l'Eau, du Sol et des Forêts, Faculté des Sciences de la Nature et de la Vie, Université Aboubekr Belkaid, Tlemcen, Algérie*

Changements climatiques et inégalités au Maroc: Une analyse territoriale

Fatima Arib (*Professeure d'Enseignement Supérieur, Faculté des Sciences Juridiques, Économiques et Sociales, Université Cadi Ayyad de Marrakech, Maroc*)

Mobilité humaine et changements climatiques : repenser l'adaptation

Intissar Ben Sbih (Professeure, Faculté des Sciences Juridiques, Économiques et Sociales de Marrakech, Maroc)

Environmental Migration in MENA region: The Case of Morocco

Carla Sofia Ferreira Fernandes (Universidade Aberta, Lisbon & the Centre for Functional Ecology, Portugal)

Comment lutter contre les « sweatshops », les ateliers de misère ?

Jacques Igalens (Professeur Émérite de l'Université de Toulouse 1 Capitole & Président de l'Institut International d'Audit Social, France)

Le droit international de l'environnement et la notion de résilience: le défi du passage d'un droit conciliateur à un droit immunisateur

Omar Qaissi (Professeur Habilité, Faculté des Sciences Juridiques, Économiques et Sociales d'Agadir, Maroc)

DISCUSSION

FRIDAY, OCTOBER 25 (morning) | VENDREDI 25 OCTOBRE (matin)

PLENARY SESSION 5 | SESSION PLÉNIÈRE 5 | 9.00-10.30

Moderator: Fatima Arib (Professeure d'Enseignement Supérieur, Faculté des Sciences Juridiques Économiques et Sociales, Université Cadi Ayyad de Marrakech, Maroc)

The Use of Polyacrylamide in Soil Protection from Weathering Erosion

Balqees M. Aldabbagh, Hanaa J. Alesa (Researcher Professor, Applied Science Department, University of Technology, Iraq)

Socio-Economic Correlates and Management Implications of Crop Raiding Around Pendjari Bio-sphere Reserve, Northern Benin

Sylvain Efiio, Sogbohossou E.A., Magnon Z.Y., Houinato M.R.B., Habiyaemye M., Sinsin B.A. & Tossou C.R. (Ph.D Student, Laboratory of Applied Ecology, Faculty of Agronomic Sciences, University of Abomey-Calavi, Benin)

Identification des situations à risques d'incendies dans la forêt périurbaine de Tlemcen et propositions d'aménagement

Berrichi Mohamed, Kherbouche Imane, Rafa Asma (Laboratoire de la Gestion Conservatoire de l'Eau, du Sol et des Forêts, Faculté des Sciences de la Nature et de la Vie, Université Aboubekr Belkaid, Tlemcen, Algérie)

مصادر الطاقة المتجددة | Sources of Renewable Energies

Hoda Ragheb Awad (Professor, Mass Communication Department, Misr International University (MIU), Cairo, Egypt)

Art of War in Noise: Sonic Devices Under a Multicriteria Sustainable Approach - The Project

Suzana Gueiros Teixeira, Jules Ghislain Slama, Luiz Pinguelli Rosa, Carlos Eduardo Milagres Pereira (Associate Professor, Federal University of Rio de Janeiro & SAGE-COPPE Researcher, Brazil)

DISCUSSION

Coffee break | Pause-café | 10.30-10.50

PLENARY SESSION 6 | SESSION PLÉNIÈRE 6 | 10.50-12.30

Moderator: Fred Kruidbos, *Biologist-Ecologist, Kruidbos Ecological Services, The Netherlands*

Water Scarcity Management for Building Resilience and Ensuring Food Security in the Kingdom of Saudi Arabia

Mirza Barjees Baig, Khodran H. Al-Zahrani, Yahya Al-Otibi, R. Kirby Barrick, Gary S. Straquadine (*College of Food and Agriculture Sciences, King Saud University, Kingdom of Saudi Arabia*)

Ensuring Food Security and Addressing Climate Change by Revisiting Agricultural Extension Programs in the Kingdom of Saudi Arabia

Mirza Barjees Baig, Yahya Al-Otibi, R. Kirby Barrick and Gary S. Straquadine (*Researcher & Professor, College of Food and Agriculture Sciences, King Saud University, Kingdom of Saudi Arabia*)

La sécurité alimentaire au Maroc : Défis et Stratégies d'intervention et de Gouvernance

Mohamed Zahour (*Doctorant, Faculté des Sciences Juridiques, Économiques et Sociales d'Agadir, Maroc*)

L'apport des chartes négociées à la régulation des droits d'usages collectifs et forestiers dans les terres collectives de parcours. Cas du Maroc

Rabiaa Bourhim (*Doctorant, Faculté des Sciences Juridiques, Économiques et Sociales d'Agadir, Maroc*)

The Effects of Land Cover Change on Sustainability: Human Security and Environmental Change in Semi-Arid Ecosystems

Taisser H.H. Deafalla, Elmar Csaplovics, Osman Elkhair, Mustafa M. El Abbas (*Faculty of Environmental Sciences, University of Dresden, Dresden, Germany*)

DISCUSSION

Lunch | Déjeuner | 12.30-14.00

FRIDAY, OCTOBER 25 (afternoon) | VENDREDI 25 OCTOBRE (après-midi)

PLENARY SESSION 7 | SESSION PLÉNIÈRE 7 | 14.00-15.30

Moderator: Kamrul Hossain, *Research Professor & Director of the Northern Institute for Environmental and Minority Law, Arctic Centre, University of Lapland, Finland*

The Common Heritage of Mankind (CHM): Developed States Vs Developing States Visions

Houcine Chougrani, Hicham El Amrani (*Associate Professor, Faculty of Law, Economics and Social Sciences, Cadi Ayyad University of Marrakech, Maroc*)

البناء العلمي التاريخي والاجتماعي لمفهوم الأنثروبوسين

The Historical and Social Construction of the Concept of Anthropocene

Abou El Kacem Ziani (*Enseignant-Chercheur, Faculté des Lettres et des Sciences Humaines, Université Cadi Ayyad de Marrakech, Maroc*)

When Environmental Inequalities Lead to Social Inequalities!

Moulay Hicham El Amrani (*Ph.D Student, Faculty of Law, Economics and Social Sciences, Ibn Zohr University of Agadir, Morocco*)

La gestion de crise lors des catastrophes naturelles : une analyse de la littérature

Soufian Samghouli, Abdelkader Tialati (*Laboratoire de recherche: Dynamiques sécuritaires, Faculté des Sciences Juridiques Économiques et Sociales de Settat, Maroc*)

In Quest of Reducing the Environmental Impacts of Wiring Harness Production with Using LCA Method

Hanaa Abouljalil, Mahacine Amrani (*Ph.D Student, Laboratory of Chemical Engineering and Valorization of Resources (LGCVR), Faculty of Sciences and Techniques, University Abdelmalek Essaadi of Tangier, Morocco*)

DISCUSSION

Coffee break | Pause-café | 15.30-15.50

ROUNDTABLE | TABLE RONDE | 15.50-17.00

Fostering the Viability and Resilience of Social-Ecological Systems: Ways Forward!

Moderator: Jacques Igalens, *Professeur Émérite de l'Université de Toulouse 1 Capitole & Président de l'Institut International d'Audit Social, France*

Speakers

- **Mahjoub El Haiba**, *Ex-Inter-Ministerial Delegate for Human Rights, Member of the National Human Rights Council, Morocco*
- **Michael R. Reed**, *Researcher & Professor of Agricultural Economics & Director of the International Programs for Agriculture, University of Kentucky, USA*
- **Fred Kruidbos**, *Biologist-Ecologist, Kruidbos Ecological Services, The Netherlands*
- **Kamrul Hossain**, *Researcher & Professor, Director of the Northern Institute for Environmental and Minority Law, Arctic Centre, University of Lapland, Finland*
- **Jane Verbitsky**, *Researcher & Professor, School of Social Sciences and Public Policy, Auckland University of Technology, New Zealand*
- **Mirza Barjees Baig**, *Researcher & Professor, College of Food and Agriculture Sciences, King Saud University, Kingdom of Saudi Arabia*

DISCUSSION

CLOSING SESSION | SÉANCE DE CLÔTURE | 17.00-17.20

Concluding Remarks

- Mohamed Behnassi, *The Conference Chair*

ABSTRACTS

PLENARY SESSION 1 | SESSION PLÉNIÈRE 1

Environmental and climate induced conflicts and their impacts on SES: Implications for the Military in the Struggle for Life (working title)

Fred Kruidbos

Biologist-Ecologist, Kruidbos Ecological Services, The Netherlands

Military organizations increasingly recognize that the security dimensions of climate change and natural resource degradation have implications for the way they plan and operate their activities. Simultaneously, most of them lack specific but crucial knowledge on ecological principles (such as metapopulations dynamics, ecological dispersion, isolation, biodiversity), its importance to ecological regime shifts, and its relation to human resilience and viability. All effecting social security, resilience opportunities and long term viability.

Human activity affecting climate change can roughly be divided into two kind of processes, affecting both socio-ecological and geo-political world stability.

Firstly, processes that primarily alter the chemical composition of the atmosphere. Emission of greenhouse gasses like CO₂ leading to a cascade of effects such as temperature rising, melting of both land and sea ice leading to sea level rising and ecological regime shifts. Secondly, processes that directly destroy existing natural systems and therefore creating climate change on a more regional scale. Deforestation in the tropical regions, for example, resulting in desertification. The lucrative poaching of species, like elephant and rhinoceros, pushing ecosystems to shift. Such processes reinforce (further) fragility of states and reinforce global security risks.

Based on policy documents, literature and panel discussions held at the Planetary Security Conference (19 and 20 February, 2019), as well as The Hague Roundtable on Climate & Security (12 September, 2019), this presentation highlights various examples of ways in which

climate change and natural resources are related to security. It first focusses on relevant ecological principles and brings it in context with international security. This is followed by a brief overview of measures to address climate change undertaken or planned by ministries of defense from various countries.

It concludes with a wider but more practical set of recommendations on how the military could address the security dimensions of climate change and natural resource stress in a way that would increase operational effectiveness while leading the way towards resource-efficient societies as well as a global network approach on cooperation in order counter the risk of a global ecological tilt.

Keywords: Climate Change, Ecology, Regime Shift, Military, International Security

A Social and Ecological System in the Arctic in Connection to Human Security: A Reference to Indigenous Communities and their Food System

Kamrul Hossain

Research Professor & Director of the Northern Institute for Environmental and Minority Law, Arctic Centre, University of Lapland, Finland

The Arctic – a region located at the circumpolar North is regarded as an environmentally sensitive space. The Arctic is geographically distributed amongst the eight nation states, and administered by the southern capitals – all located beyond the region. However, this geographic space share common characteristics trans-nationally than that of between Southern capitals and Arctic area in each of these countries. The region is rapidly being transformed due to various stresses, resulted from, for example, effects of climate change and increasing human activities, which eventually contribute to changes in social and ecological systems. This transformation offers adverse environmental consequences putting the region's sparsely populated communities, including among others, diverse groups of indigenous peoples, under threats in terms of maintaining their healthy association with unique Arctic environment. But such a change also

bring opportunities for its population, such as introduction of digital infrastructure that on one hand offer a new life style, but on the other hand, threatened traditional identity as the Arctic people. Against this background, this presentation offers a narrative analysis from the viewpoint of human security to which food security is a component. To the extent human security framework offers broader and flexible meaning, it is important to see how environmental risk management can be placed in order to promote sustainability and greater resilience for the maintenance of a traditional food system of indigenous Sámi community. The paper thus looks into the point of integrating human security approach in the management of environmental risks given that the approach, while complements aspects of human rights, offers practicable strategies to promote community wellbeing.

Antarctica, Tourism, Risk and Vulnerability

Jane Verbitsky

Researcher & Professor, School of Social Sciences and Public Policy, Auckland University of Technology, New Zealand

In the lead up to COP25, Chile, the 2019 COP President and conference host, has proposed seven additional topics for the conference: Oceans; Antarctica; Electromobility; Renewable Energies; Circular Economy; Ecosystems and Forest; and Biodiversity. The inclusion of Antarctica among the topics is a significant one. The coldest, driest and windiest place in the world, Antarctica plays a central role in the earth's ecosystem with its geography, weather and climate systems influencing globally significant processes. The continent has been described as a "barometer of change" able to "act as a buffer to changes or continue climate changes long after the triggers have been stabilized" (Cool Antarctica: Climate Change, Science in Antarctica), a depiction consistent with the Intergovernmental Panel on Climate Change's statement (2007, po.655) that the Arctic and Antarctic are "the regions with the greatest potential to affect global climate and thus human populations and biodiversity."

Antarctica is also a thriving tourist destination, increasingly attracting visitors keen to encounter one of the most pristine places left on the planet. From fewer than a thousand visitors per year prior to the 1980s the number has surged upwards, reaching more than 56,000 in the austral summer of 2018-2019. So popular has the white continent become as a tourism destination that Antarctica is now enticing "last chance" tourists (Lemelin et al., 2010), visitors who want to experience an endangered or disappearing region before it is irrevocably changed.

Antarctic tourism falls under the governance mandate of the Antarctic Treaty System, an international regime established with the signing of the 1959 Antarctic Treaty. However, despite tourism being a recurring issue for the Antarctic Treaty Consultative Parties (the decision-making states of the Antarctic Treaty System) at their annual meetings since the mid-1960s, they have to date been unable to agree upon a comprehensive tourism management policy for Antarctica. This has raised concerns about the anthropogenic impacts of cumulative visitation upon the continent, the tensions between national and common interests in Antarctica, and how Antarctica can be safeguarded for current and future generations.

This paper examines Antarctic tourism as a case study of geopolitical risk and social-ecological vulnerability in the international system. It analyses the inter-related challenges to effective governance of Antarctica, sustainable management of tourism in the continent, and intra and inter-generational justice obligations in an area of the earth essential for managing climate change that is claimed both as a commons and as a national extension of seven different states.

Pro-Environmental Behaviour and Social Trust

Ian Alcock

Researcher, European Centre for Environment and Human Health, University of Exeter, UK

Progress on changing human behaviour to meet the challenges of regional and global sustainability has been slow. This study examines

the role of social trust in influencing people's willingness to behave in pro-environmental ways. Many believe it is only worth making sacrifices to behave in sustainable ways if others also do so, and social trust is known to be related to confidence in others to act in the common interest. This study looks at different pro-environmental behaviours which involve contrasting levels of personal sacrifice, to examine how social trust is related in each case. Mediation of relationships via optimism/pessimism about climate change is also considered.

PLENARY SESSION 2 | SESSION PLÉNIÈRE 2

The Current and Future Role of Agriculture in Global Greenhouse Gas Emissions

Michael R. Reed

Researcher & Professor of Agricultural Economics & Director of the International Programs for Agriculture, University of Kentucky, USA

The current and future role of agriculture in global greenhouse gas (GHG) emissions is presented and discussed. The GHG emissions of leading agricultural producing countries are tracked over time and the implication of these trends are discussed by country. The source of these emissions from the various agricultural production techniques are shown and ways of cutting these emissions by country are discussed. Emissions from soils are handled in the same way. Finally, the potential to reduce GHG emissions effectively from agriculture and soil use are suggested and potential new technologies are also included. The economic costs or advantages of each potential change is identified.

Les promesses d'une nouvelle approche économique dans la perspective d'un effondrement global – L'économie symbiotique comme horizon

François Cadoux (Professeur, École Supérieure des Arts Visuels de Marrakech, Maroc)

La communauté scientifique unanime nous avertit des dangers qu'il y aurait à laisser courir le laisser-aller écologique et climatique actuel. La perspective presque inéluctable d'un réchauffement supérieur à 2°C provoquerait un emballement de conséquences destructrices impossible à enrayer ; et cette situation inquiétante devient alarmante si on la place dans son cadre global. L'augmentation irréfrenée de la consommation, l'aggravation de la pollution sous toutes ses formes, le dépassement du pic pétrolier annonçant une crise énergétique, la raréfaction des matières premières et les manœuvres diplomatiques qui y sont liées, l'inquiétude sur les ressources en eau, la diminution probable de la production agricole, alors que la population du globe augmente, et la crise économique majeure que tout le monde aujourd'hui annonce mais que personne ne réussit à conjurer, tous ces périls entretiennent entre eux des liens d'aggravation mutuelle qui les rend encore plus effrayants et moins remédiables.

Pendant ce temps, l'humanité, les yeux rivés sur les indicateurs dépassés de la croissance économique, du PIB, et de tout ce qui peut sembler rassurant à court terme, continue son chemin. Ce chemin suit imperturbablement les courbes tracées il y a 47 ans par l'équipe du Pr Meadows dans la perspective appelée par lui BAU, "Business as usual". Cette évolution nous conduit au chaos.

Soyons humbles : personne ne peut aujourd'hui prédire de façon précise ce qui va se passer ni quand. Mais on ne peut rester immobile alors que des événements graves deviennent probables, mettant en danger notre mode de vie et risquant même, selon certaines sources, de mener à la disparition de l'humanité dans le cadre de la 6e extinction de masse des espèces, déjà largement engagée.

Que peut-on faire alors qu'aucune certitude n'existe plus ? Deux choses. Préparer le choc probable – c'est la résilience ; et dessiner l'avenir souhaitable après la tourmente. Dire ce qu'on peut faire maintenant pour se préparer à la crise imminente et pour remplacer ensuite le vieux système économique qui n'offre plus d'avenir.

Ma réflexion s'appuie sur les travaux de Mme Isabelle Delannoy, qui a développé dans un ouvrage fondateur sa conception de l'économie symbiotique. Cette approche a plusieurs aspects particulièrement féconds :

- d'abord son caractère holistique. Car de nombreuses propositions en soi très prometteuses, comme l'économie circulaire, l'économie bleue, l'économie de la fonctionnalité... ne sont pas à elles seules capables de rompre avec le vieux système et l'illusion d'une « croissance verte » que chacun aujourd'hui reconnaît irréalisable.
- Son aspect réaliste : ce n'est pas une utopie, mais la projection d'une réalité déjà existante, car cette économie symbiotique, avant d'avoir été théorisée, est déjà expérimentée par certains acteurs économiques, et peut donc être évaluée.
- Sa compatibilité avec les grands équilibres socio-économiques de la biosphère - ceux-là même que la civilisation thermo-industrielle est en train de détruire. Il ne s'agit pas d'exploiter la nature mais de travailler avec elle.
- Le fait qu'elle est immédiatement réalisable, et donc capable de favoriser à court terme la résilience, tout en préparant une solution d'avenir pour remplacer la civilisation thermo-industrielle défailante.

Enhancing Resilience for Food and Nutrition Security within a Changing Climate

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Climate change is adversely affecting food production systems while increasing the vulnerability of human societies – especially resource-poor small producers – and diminishing their resilience to food and nutrition insecurity. Even with a 1.5°C scenario, climate change is believed to leave disadvantaged populations

weakly resilient to food, health, and livelihood insecurity. Additionally, the scale of change required to limit warming to 1.5°C is historically unprecedented and can only be achieved through strategically important societal transformation and ambitious mitigation measures, a requirement still not efficiently met by the majority of countries, especially key carbon emitters. This chapter accordingly draws attention to some knowledge gaps that have to be tackled on priority to stall and reverse current trends while identifying some credible actions at the grassroots. The analysis assesses projected impacts and challenges posed by climate change at the interface of food security and resilience, with a focus on some international and regional perspectives. Robust policy options to reinforce the resilience for food and nutrition security in a changing climate are also developed.

Keywords: Climate change, Food and nutrition insecurity, Food production systems, Resilience, Gender, Chemical ecology, Community engagement, Scientific uncertainty

Health Safety as a Challenge for the Resilience and Viability of Social-Ecological Systems (SES)

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The environment plays a vital role in protecting human health and development. Various Studies have attributed environmental risks as potential threat to human health. However, for many years, we lacked ability to consistently track health effects attributed to environmental risks. In field of environmental health, Morocco, faces “traditional” and “modern” pollution risk. The former risk arises owing to paucity in access to basic human amenities (sanitation, drinking water, waste management) in certain areas. While lateral risk is attributed to pollution generated by Industries, urbanization, intensive agriculture etc. Significant efforts are

undertaken to reduce stress on deteriorating environment. The national programs contributing to it are: Healthy drinking water supply, solid waste management, urban wastewater reduction, industrial pollution control, mitigation of proliferation of disease vectors etc. However, despite the magnitude and diversity of these activities, several constraints remain and slow down recuperation of environmental health. These constraints include:

- Delinquent and limited co-ordination between various stakeholders, often sectoral approach which fails to account for environment and health issues.
- Lack of monitoring and monitoring programs to evaluate state of environmental degradation and health of population exposed to the deteriorating environmental conditions. Additionally, exchange of information from existing program is limited and lacks in efficient information dissemination.
- Lack of expertise for risk assessment and retrospective and prospective study to support decision making.

It is within this framework, project "Health Safety in Casablanca" was launched in collaboration with local authorities, to achieve state of art in health and environment. The objectives assigned to this project are summarized as follows:

- Identify priority health risks related to environmental degradation.
- Strengthen research actions for these environmental risks, at regional and local level;
- Promote integration of environmental health promotion into sectoral development policies.

The priorities for the project are:

- Improve management mechanisms by developing an integrated approach that improves means to prevent and reduce risks, and promotes actions to act upstream.
- Take into account local specificities and strengthen collaboration between the regional and local level so as to ensure that responsibilities are defined at the appropriate level and that the measures identified are adapted to local needs.

- Reduce high-impact health exposures and protect vulnerable people.

Keywords: Health safety, Environmental Hazards, Environmental Factors, Emerging Risks, Geographical Information System

PLENARY SESSION 3 | SESSION PLÉNIÈRE 3

Social-Ecological Systems Resilience: At the Limits of Hegemonic Masculinity

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A key challenge of the Anthropocene era is to advance human development without crossing many of the ecological thresholds and undermining of critical ecological services. The purpose of this paper is to show that we cannot hope for social ecological resilience, viability and stasis if the underlying value systems of society, especially hegemonic masculinity tendencies remain untouched. The paper underscores that hegemonic masculinity tendencies have a larger ecological footprint that is responsible for the emergence of many social-ecological risks and emergencies, which cause many of the dynamics of vulnerability, insecurity and crises for both the social and the ecological systems. The paper observes that although attempts have been made to integrate a gender perspective into social-ecological resilience analysis, much of this research has focused on the understanding of the interdependent relations between the social-ecological systems and gender. This paper transcends such paradigms to argue that it is not enough. What is needed is not a mere incorporation of gender analysis but the transformation of hegemonic masculinity value systems because these have significant influence on socio-ecological resilience. Furthermore, the paper shows that it is the same hegemonic masculinity tendencies that contribute to the incapacity of society to manage the dynamics of the risks. The paper uses Raewyn Connell's (1987) theory of hegemonic masculinity as a point of reference, to show how hegemonic masculinity acts as a structural and systemic driver of social -ecological systems insecurity, vulnerability and risks. The paper proposes for a

shift to a gender transformative paradigm in social-ecological systems resilience that targets hegemonic masculinity.

Keywords: Hegemonic Masculinity; Socio-Ecological Resilience; Ecological Footprint Ecological Services; Carbon Footprint

Gendered Perspective: Climate Change Adaptation Strategy in Malawi

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As recent as 2015, Least Developed Countries Expert Group (LEG) reiterated the need to stress understanding of climate change adaptation from gender perspectives. This does not only call for integrating a new dimension into existing conceptual frameworks; but also mainstreaming it to capture existing research gaps and drawing linkages on the themes of climatic shock nature, attributes of the system affected and response characteristics hence the focus of this chapter. Thus, this research set-out to test the hypothesis that gender is independent of adaptation strategy and investigate factors influencing adaptation strategy. Chi-squared test of independence and multiple logistic regression analysis were employed. The chi squared test produced p-value as 0.216 hence no statistically significant association between gender and type of adaptation strategy. The regression analysis concluded women with basic and advanced education are more likely to adopt autonomous adaptation strategy compared to women without education; access to information resulted in adoption of autonomous adaptation while women with access to credit are less likely to adapt autonomously. Moreover, poor women are more likely to adopt autonomous adaptation strategy compared to rich women. It is recommended that adaptive capacity of women be focus on in improving adaptation rather than external support.

Keywords: Climate change adaptation, Gender perspectives, Malawi adaptation strategy, autonomous adaptation, Climate change shocks

Resilience Building Initiatives to Counter Shocks and Stressors Affecting Rural Communities in Chiredzi District, Zimbabwe

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Zimbabwe has experienced innumerable shocks and stressors which are bedeviling economic and social development. Shocks in the form of natural hazards (droughts, floods), epidemics, environmental degradation and cash crisis severity, scope and impact has necessitated coalition of stakeholders and development of resilience building initiatives to counter shocks and stressors in a manner that protects livelihoods and recovery gains. This study sort to assess the effectiveness of implemented resilience building initiatives to counter shocks affecting rural communities of Chiredzi District. Initiatives were implemented through the Enhanced Community Resilience and Sustainability (ECRAS) projects led by CARE and PLAN targeting to increase the capacities of Chiredzi District communities to withstand shocks and stressors. Questionnaires, interviews and direct field observations were used to gather field data. Questionnaires were electronically administered using kobo collect to respondents randomly selected from conveniently sampled wards involved in resilience building initiatives in Chiredzi district. Interviews were conducted with purposively sampled key informants who included District Agritex officer, District Administrator, District Social Services, Care International Monitoring and Evaluation Officer, Plan Project facilitator and Ward Councilors. Findings revealed three main categories of resilience building initiative in the rural communities of Chiredzi District namely crop production related initiatives, livestock production related initiatives and social and well-being related initiatives. Resilience building initiatives are effective tools to deal with recurrent shocks and stressors in rural communities of Chiredzi district which are being projected to continue for the next decades.

Keywords: Building Resilience Initiatives, Shocks, Stressors, Rural Communities, Chiredzi District.

Using Impact Chains to Understand Multi-Hazard Risk in the Marrakech-Safi region, Morocco: A Participatory Tool to Support Risk Assessment in Socio-Ecological Systems

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The region of Marrakech-Safi is one of Morocco's most important demographic and economic poles, highly dependent on agricultural and touristic activities. At the same time, the region is threatened by several natural hazards, particularly floods and droughts. Combined with spatially varying conditions of exposure and vulnerability of both its population and ecosystems, this may result in high levels of socio-ecological risk and associated impacts. Understanding which social and ecological drivers contribute to multi-hazard risk in Marrakech-Safi is essential for both the assessment of current and future risk, as well as for the identification of entry points for effective risk reduction. Given that risk is co-produced by the interplay of human and environmental factors, a socio-ecological approach that goes beyond considering natural hazards and societal vulnerability is needed to assess risk from a holistic perspective.

In the context of the EU-funded ARIMA project (01/2019-12/2020), which aims at assessing current and future multi-hazard risk for Marrakech-Safi, drivers of vulnerability and risk have been identified through literature review. The review encompassed peer-reviewed sources (selected through both systematic and snowball

mapped using impact chains (cause-effect chains). This methodology is particularly suited to conceptualize how the interaction between drivers of each subcomponent of risk (hazard, exposure and vulnerability) can be conducive to specific impacts for the system of interest.

Results of the review show a strong influence of human-induced environmental degradation on the severity of the hazards and their possible impacts. This desk-based analysis, and the resulting impact chains, will be validated during an upcoming stakeholder workshop, where the particular socio-ecological profile of Marrakech-Safi will be represented by a diverse array of experts and stakeholders in the field of agriculture, risk management, regional planning and water management. The outputs of the impact chains analysis will inform the collection of data for the indicators connected to the selected drivers of risk. Ultimately, indicators will be processed to obtain an index of socio-ecological vulnerability which, combined with exposure and hazard information, will feed into the final multi-hazard risk assessment for Marrakech-Safi. The inclusion of impact chains into an index-based risk assessment offers the possibility of highlighting socio-ecological relationships, thus providing a more thorough risk profile of the Marrakech-Safi region, while also highlighting entry points for risk reduction and adaptation.

The talk will focus on the preliminary results of the current multi-hazard risk assessment, highlighting the contribution of impact chains in determining drivers of risk for the region and possible further uses of this methodology in the context of multi-hazard risk assessment.

Keywords: Impact Chains, Multi-Hazard Risk, Socio-Ecological Systems, Marrakech-Safi, Vulnerability

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This paper examines an experience of environmental education held by primary schools as part of the Eco-Schools program in Morocco, and which is initiated by Foundation Mohammed VI for Environmental Protection.

The Eco-Schools Experience in Environmental and Sustainability Education

sampling methodologies) and grey literature, and yielded an extensive preliminary list of drivers of risk for the region. Based on the outcomes of the review, relevant relationships between drivers of risk and actual impacts of floods and droughts on the urban population and on both irrigated and rain-fed agricultural systems in the region were explored and

Throughout this project, schools' pupils are being introduced and sensitized to various environmental issues, and consequently led to develop more positive behaviours to respond to those issues. The project takes from one to two years to fulfil the requirement of the program's committee. Nevertheless, it is endless in scope and has to be maintained and renewed every year to keep the nomination and Green Flag of Eco-schools. The experience methodology is built on several steps - from environmental diagnosis to the development of a plan of action and its continuous evaluation- which the students will complete as a group or "eco-committee".

The efforts put into the experience will culminate in being awarded the Green Flag after several assessments by national and regional committees which will be carried out every year. The Eco-School project aims at creating awareness and positive attitudes toward the environment among students at a very young age.

Keywords: Environmental Education, Eco-school, Eco-committee, Biodiversity, Global citizenship

PLENARY SESSION 4 | SESSION PLÉNIÈRE 4

Changements climatiques et inégalités au Maroc: Une analyse territoriale

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Son climat semi-aride à aride, sa situation géographique et sa grande variabilité climatique intrinsèque, font du Maroc un des pays méditerranéens les plus vulnérables au changement climatique global. Les impacts devraient être inégalement importants. Les territoires et les groupes sociaux vulnérables sont le plus souvent affectés de manière disproportionnée par les changements climatiques et sont aussi, le plus souvent, mal préparés et mal outillés pour y faire face, ce qui accentue leur vulnérabilité et les entraîne vers

plus de pauvreté et d'exclusion. L'objectif de cette communication est d'analyser les impacts des changements climatiques au Maroc en termes d'inégalités territoriales et sociales. Il montre comment de nombreux paramètres sociaux et environnementaux interviennent dans la nécessité d'un changement de la logique économique dominante, en introduisant de nouvelles notions comme la justice, pour réduire les inégalités. L'échelle territoriale apparaît ainsi comme une dimension à part entière à prendre en compte, dans une telle logique combinant pauvreté au changement climatique.

Mots-clés : Maroc, Changement climatique, Inégalités, Territoire, Populations Locales

Mobilité humaine et changements climatiques-Repenser l'adaptation

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Au fil du temps, les populations ont souvent eu recours à la mobilité comme méthode d'adaptation à divers bouleversements d'ordre politico-religieux, économique ou démographique. L'intensification des déplacements enregistrée depuis les années 1990 se caractérise par l'émergence de nouvelles causes, des facteurs économiques, des facteurs sociaux, des facteurs d'insécurité et des facteurs environnementaux. Selon un rapport produit par l'organisation humanitaire britannique Christian Aid, il y aurait déjà 163 millions de personnes ayant dû quitter leur foyer suite aux conflits, catastrophes naturelles et grands projets de développement (mines, barrages, périurbanisation, cultures d'agro carburants, etc.). Et, de 2000 à 2050, ce sont au moins un milliard de personnes qui devraient migrer de par le monde, dont plus de la moitié pour s'adapter aux changements climatiques ou en fuir certaines conséquences. Cette mobilité climatique apparaît comme un phénomène d'ampleur conséquente. D'abord, elle témoigne de l'échec des politiques d'adaptation aux changements climatiques et de la prévention de la dégradation de l'environnement. Et d'un autre côté constitue une réaction de survie de

populations en danger, et pourquoi ne pas dire une stratégie possible d'adaptation.

Mots-clés : Mobilité humaine, Changements climatiques, Adaptation, Vulnérabilité, Protection, Dégradation.

Environmental Migration in MENA region: The Case of Morocco

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The importance of environmental factors in the process of human mobility is acknowledged by the IPCC, UNFCCC and the Global Compact for Safe, Orderly and Regular Migration. However, the complexity of the drivers of migration tend to limit its analysis from an environmental and climate change perspective, since these factors are interconnected with more salient issues such as economic motivations for migration. On the other hand, migrants can also contribute to adaptation strategies to climate change in their home communities. In order to address the positive potential of migration, it is relevant to integrate it in the overall discussion of adaptation to climate change.

This paper aims to present an overview of the studies that focus on the nexus migration-environment-climate change in the MENA region, highlighting the existing knowledge and methodologies used for data collection. A special emphasis is given to the case of Morocco, which is a polymorphic country in terms of migration flows (internal and international migration and transit country). The main source of information is the CliMig bibliographic database, which is the first comprehensive collection of resources that concentrates specifically on migration, the environment and climate change.

By understanding the current state of the art in terms of research it is possible to identify knowledge gaps in the region and to summarize existing policy recommendations on migration as an adaptation strategy.

Keywords: MENA region, Climate change, Migration, Adaptation

Comment lutter contre les « sweatshops », les ateliers de misère

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Les chaînes d'approvisionnement mondiales constituent un mode d'organisation de plus en plus courant de la production et des échanges dans l'économie mondiale, on les appelle également les chaînes globales de valeur. Elles ouvrent des perspectives de progrès tant dans les pays développés en permettant à leur main d'œuvre de se consacrer à des tâches de conception et de commercialisation que dans les pays en voie de développement en créant des emplois. Lorsque les employeurs respectent la législation locale et les normes internationales de l'OIT, les chaînes d'approvisionnement permettent aux travailleurs des pays en voie de développement de mener une vie décente. Cependant, de nombreux exemples montrent que les chaînes d'approvisionnement mondiales peuvent également participer à la création ou au maintien d'ateliers de misère

Dans cette communication nous montrons comment caractériser, débusquer et lutter contre les ateliers de misère notamment en s'appuyant sur le devoir de vigilance des sociétés multinationales, l'audit social et les ONG. Le problème des femmes dans les ateliers de misère est particulièrement abordé.

Mots-clés : Ateliers de misère, Audit social, Responsabilité sociale de l'entreprise, Devoir de vigilance, Femmes.

Le droit international de l'environnement et la notion de résilience: le défi du passage d'un droit conciliateur à un droit immunisateur

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Si la structure normative du droit international de l'environnement est fondée sur la

philosophie de durabilité à travers une panoplie de principes (prévention, précaution, pollueur-payeur, responsabilités communes mais différenciées), se pose la question de savoir si la notion immunisatrice de résilience devant le risque ou le choc, pourrait-elle constituer une pierre dans la construction d'un édifice normatif mariant durabilité et curabilité?

PLENARY SESSION 5 | SESSION PLÉNIÈRE 5

The Use of Polyacrylamide in Soil Protection from Weathering Erosion

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Polyacrylamide is a water-soluble polymer used to bind soil particles together for gain stability against air erosion. It is highly water-absorbent. This search aims to study the polyacrylamide properties like thermal degradation and melting point by Differential Scanning Calorimetry (DSC). Surface parameters like roughness, bearing index, and core fluid retention index, Valley fluid retention index, and core fluid retention index were tested by atomic force microscopy .surface runoff for soil stability also tested under different condition by using an spray gun. Weight loss also was tested for soil stability conclusion. Soil samples were prepared from 25% mixing of sandy soils with 75% clay soil. The molds were prepared with a dimensions of (1 m * 75 cm * 10 cm) for four samples and sprayed with different concentrations of polyacrylamide that dissolved in water with different concentrations including 25%, 35% and 45% and left for 24 hours for drying of samples. Samples were subjected to artificial rainfall for 12 hours after being placed at a 10 ° angle to increase the rate of erosion. Results prove the surface runoff decreases with increasing of polyacrylamide concentration. Weight loss of soil decreases with increasing of polyacrylamide concentration.

Keywords: Soil Stability, PMA, Surface Runoff

Socio-Economic Correlates and Management Implications of Crop Raiding Around Pendjari Biosphere Reserve, Northern Benin

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Human-wildlife conflict is becoming a serious threat for both wildlife conservation and human wellbeing. Its main manifestations were livestock predation and crop raiding. This paper examined the extent and patterns of crop raiding, the financial impacts and determinants of crop raiding by wildlife in the Pendjari Biosphere Reserve, northern Benin. Data were collected in January and February 2017 through a questionnaire survey of 209 farmers of the surrounding villages of the Reserve. Of 209 household surveyed, 98,1% reported losses of crop every year due to wildlife. The most destroyed crops were maize (30,41%), cotton (29,02%), millet (25,63%) and sorghum (22,86%) by baboon (67%), warthog (13%) and elephant (10%). Crop raiding occurred mainly during seedling and harvest periods from June to December. Farmers can lose from 42,264 XOF (US\$ 76.8) in millet farm to 163,674 XOF (US\$ 297.6) in maize farm. To reduce crop raiding damages, farmers use mainly guarding (93,3%), scarecrows (74.2 %), and fires on the outskirts of the fields (69.4 %). Considering the importance of losses, it appears important to reinforce mitigation measures, develop more income-generating activities from wildlife and create a dynamic compensation plan in order to relieve local communities around Pendjari Biosphere Reserve.

Keywords: Crop Raiding, Socio-Economic, Wildlife, Pendjari Biosphere Reserve, Benin

Identification des situations à risques d'incendies dans la forêt périurbaine de Tlemcen et propositions d'aménagement

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La forêt domaniale de Tlemcen est un site à forte fréquentation humaine en raison de sa fonction récréative. Cette situation lui fait exposer à de nombreux risques de départs d'incendies, cette forêt est constituée de 5 cantons . Dans ce travail, chaque canton a fait objet d'identification de risques et de propositions d'aménagement. Les risques sont liés (i) aux habitats et à leurs natures, (ii) à la nature des interfaces, (iii) à la présence des aires de jeux et de repos, (iv) aux lignes électriques et autres décharges clandestines.

Mots-clés : Forêt péri urbaine, Risques d'incendies, Proposition d'aménagement, Tlemcen

Art of War in Noise: Sonic Devices Under a Multicriteria Sustainable Approach - The Project

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In the Art of War, Sun Tzu has quoted: *If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle*; based on those sayings we highlight the aspects of noise and vibration in its impacts on living beings, how damaged might they be, depending on physical and psychophysical conditions of beings and environment, and question, based on a multicriteria approach, the concepts of noise repellants, sonic non-lethal weapons and other devices generating the soundscape scenarios over human health and other species in the environment. This publication is a result of the many insights given from different approaches

brought together for the creation of a new research group addressing: vibration, sustainable management and strategic planning, with special emphasis being given on sonic devices under a defense approach.

Keywords: Sonic Devices, Noise, Sustainable Management, Multicriteria, Defense

Sources of Renewable Energies | مصادر الطاقة المتجددة

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يتطلب المستقبل ضرورة إحلال الطاقة الشمسية بالتدرج محل مصادر الطاقة الأخرى مثل الغاز في توليد الكهرباء. وذلك للحد من التلوث وحديات المستقبل. فعلى الرغم من أن احتياطي النفط بلغ 716 مليار برميل بنسبة 56% من الاحتياطي العالمي، إلا أن نمو الطلب على استهلاك الطاقة في العالم العربي يمثل مشكلة شديدة الحظورة، حيث بلغ استهلاك البلدان العربية بنحو 14.6 مليون برميل من حجم الإنتاج الباق 28.9 مليون برميل بحسب الإحصاءات الحديثة وبرغم توالي الاكتشافات في المياة الإقليمية للبلدان الواقعة على شرق المتوسط مثل مصر والأردن وإسرائيل ، وجنوب أوروبا قبرص واليونان إلا أنه يوجد مخاوف كثيرة من جهة الخبراء بنضوب الطاقة النفطية والغاز قبل توفير الحلول البديله. وهذا التحول من الثراء إلى الندرة يهدد مستقبل التنمية الاقتصادية مما يحتم ضرورة التوسع في مجالات الطاقة المتجددة وعلى رأسها الطاقة الشمسية. كيف يمكن استغلال الطاقة الشمسية ومصدر هذه الطاقة متوفر في البلدان العربية. ما هي التحديات التكنولوجية والثقافية والسياسية التي تواجه عملية إحلال الغاز والنفط والكربون بالطاقة الشمسية وهي طاقة نظيفة لا تسبب نسبة التلوث التي تسببه الطاقات الأخرى.

PLENARY SESSION 6 | SESSION PLÉNIÈRE 6

Water Scarcity Management for Building Resilience and Ensuring Food Security in the Kingdom of Saudi Arabia

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Endowed with limited renewable water resources and arid to hyper-arid, only small parts receive more than 250 mm of annual rainfall in the Kingdom of Saudi Arabia (KSA). The Kingdom relies heavily on reserves of non-renewed 'fossil' groundwater and on man-made, desalinated water. The water resources of the Kingdom are concentrated on the Shelf, which has 100% of the non-renewable resource and

almost 60% of the renewable resource. However, only a fraction of both non-renewable and renewable resources can be economically developed due to problems of location, access, and distance from point of use.

KSA has a significant fossil groundwater reserves. However, abstracting this water too fast or in too great a quantity soon harms its quality, and much of the reserve is very deep or very far from population centers, making it extremely expensive to bring into use. Also, this reserves of groundwater resource is non-renewable and the demand of it is fast using up.

Saudi Arabia consumes ~17.41 bcm (billion cubic meters) of water annually for municipal, industrial and agricultural purposes. Only 20% (~4 bcm) of this water comes from renewable sources; the rest of it is mainly nonrenewable water. Agriculture in KSA accounts for 85% (~14.42 bcm) of the total annual water use. Presently employed irrigation systems are characterized by relatively low efficiency rates of operation, resulting in excessive water demand. Sprinklers operate over the maximum area (~53%), accounting for 63% of production. While trickle and drip systems cover ~20% of cultivated area, they account for ~17% of production. Flood systems cover 15% of area, producing ~15% of agriculture output. The rest of the area, production and water consumption are covered by rain-fed irrigation systems.

By 2030, the water and agriculture scene is likely to look very different than it does today, as a result of policies currently being implemented. Water is becoming scarce not only in arid and drought prone areas but also in regions where rainfall is abundant: water scarcity concerns the quantity of resource available and the quality of the water because degraded water resources become unavailable for more stringent requirements. In the situation, a series of technical and policy changes on the water use are needed. The changes include planning that integrates water quality and quantity and considers the entire water system; promotion of demand management; tariff reform for water supply, sanitation, and irrigation; strengthening of government agencies. A coupled

environmental, economic, and social approach is required in valuing the water, while an integrated technical and scientific approach is essential to develop and implement the management practices appropriate to deal with water scarcity. Therefore, coping with water scarcity would require measures and policies to cater demand and supply.

Ensuring Food Security and Addressing Climate Change by Revisiting Agricultural Extension Programs in the Kingdom of Saudi Arabia

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The Kingdom of Saudi Arabia (KSA) is one of the world's most water-stressed countries occupying the high and extreme risk position. It is not an ideal state for agriculture and is not capable of producing enough to feed its citizens due to its harsh and hot temperatures, low rainfalls, limited arable lands, lack of fertile soils, absence of permanent water bodies and diminishing water resources. With the quest to enhance food self-sufficiency, Saudi Arabia faces serious challenges due to the factors like aridity, limited cultivable land, scarce water resources and serious implications of climate change. Factors like climate change, over-extraction of rapidly depleting aquifers and population growth will put further stress on scarce water resources and create an issue of food security. Climate Change will have a more pronounced effect on water resources and cropping systems. A small change in the temperature would mean a lot to agriculture. The Kingdom has experienced prolonged droughts and floods due to climate change and the issue of climate change in turn further implies the threat to the food security situation. The KSA is working hard to ensure its food security through imports and that is not a solution to the long-existing issue. The analyses indicate that issues of climate change and food security are real and they deserve permanent solutions. It is anticipated that extension

education can help to address the newly emerged challenges like climate change to elevate sustainable crop yields to ensure food security in the Kingdom. In the situation, the Kingdom of Saudi Arabia needs to make radicle changes in its agricultural extension system more responsive to the needs of the farmers making them more scientific and prepare its staff by equipping them with the knowledge to address the newly emerged challenges adequately. Without bringing the subjects of climate change, early warning systems, and food security, extension educators would not be able to make any difference in the field. Serious efforts are needed to examine the needs of the day, tailor the extension education programs to enable its field workers to offer sustainable solutions.

La sécurité alimentaire au Maroc : Défis et Stratégies d'intervention et de Gouvernance

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La sécurité alimentaire est un enjeu majeur et un défi croissant dans le monde en développement. Elle joue un rôle primordial dans la lutte contre la pauvreté et son absence affecte de façon négative la santé et l'éducation des gens et leur capacité à travailler, à faire valoir leurs droits et à atteindre l'égalité. A cet effet et conscient que le développement de chaque pays passe par une bonne gouvernance de la sécurité alimentaire, cette dernière suscite un intérêt stratégique de plus en plus soutenu de la part des pouvoirs publics des partenaires au développement, des organisations de la société civile, du secteur privé et des professionnels, afin de mettre un cadre de référence et d'orientation pour tous les acteurs qui interviennent en faveur de la lutte contre la pauvreté, la malnutrition et pour l'atteinte d'une sécurité alimentaire durable.

Le concept de la sécurité alimentaire a connu une évolution considérable au fil des années, en 1996, le concept est redéfini à Rome lors du Sommet Mondial de l'alimentation : "La sécurité

alimentaire existe lorsque tous les êtres humains ont, à tout moment, un accès physique et économique à une nourriture suffisante, saine et nutritive leur permettant de satisfaire leurs besoins énergétiques et leurs préférences alimentaires pour mener une vie saine et active." En effet, l'un des principaux défis pour les gouvernements consiste à fournir des aliments nutritifs en quantité suffisante pour répondre à la demande accrue sous l'effet de la croissance démographique et de l'évolution des régimes alimentaires, tandis que les ressources naturelles disponibles ne cessent de diminuer en quantité et en qualité. Un autre élément à prendre en compte est l'incidence du changement climatique sur la production agricole, la nutrition, les ressources naturelles et les systèmes alimentaires, cette incidence contribue à l'augmentation des risques d'insécurité alimentaire surtout au niveau des populations les plus vulnérables.

Pour faire face à toutes ces évolutions et phénomènes, l'année 2015 était l'année de l'adoption dans le cadre de l'ONU d'un accord mondial sur les 17 Objectifs de Développement Durable en septembre à New York et de l'Accord de Paris sur le climat en décembre. Par ailleurs, la situation de la sécurité alimentaire au Maroc semble d'être inquiétante pour plusieurs raisons notamment l'augmentation de la pénurie de l'Eau au fil des Années, l'exploitation abusive des eaux souterraines, la dégradation de la biodiversité et des sols, les effets pervers des changements climatiques, les problèmes liés à la gouvernance et les fluctuations des prix des énergies...

C'est dans cette optique que vient s'inscrire cette communication ayant pour objectif la mise en exergue des différents facteurs menaçant la sécurité alimentaire au Maroc et les stratégies d'intervention et de gouvernance.

- Quels sont donc les facteurs de risque menaçant la sécurité alimentaire au Maroc?
- Et quelles sont les stratégies d'intervention et de gouvernance adoptées par le Maroc pour faire face au risque de l'insécurité alimentaire ?

Mots-clés : Sécurité alimentaire, Risques environnementaux, Développement durable, Systèmes socio-écologiques, Gouvernance, PEV

L'apport des chartes négociées à la régulation des droits d'usages collectifs et forestiers dans les terres collectives de parcours - Cas du Maroc

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Au Maroc, les terres collectives de parcours couvrent plus de 54 millions d'hectares. Ces terres collectives de parcours sont dans la plupart des cas des terres marginales pour les cultures annuelles pour diverses raisons (sécheresse, faible fertilité du sol, risque d'érosion, etc.). Leur statut juridique s'oppose également à leur développement par des cultures intensives.

Il n'y a pas si longtemps, les terres collectives de parcours étaient dans un état d'équilibre entre l'offre de ressources fourragères et la demande de bétail. Cependant, au cours des dernières décennies, l'état de ces terres collectives a continué de se détériorer en raison de nombreux facteurs, notamment le surpâturage, le défrichement et le déracinement.

En effet, le déclin des rôles des institutions traditionnelles, la lourdeur des procédures administratives en matière d'autorisations de transhumance, le non-respect de la réglementation en vigueur, l'analphabétisme, la non implication de la population locale et des ayants droit, le manque de légitimité du droit, contribuent au déclenchement des conflits importants, ce qui nécessitent la recherche des pactes, compromis ou chartes négociées relatifs à l'accès à la terres et à l'exercice des droits d'usages, légitimes aux yeux des sédentaires et des transhumants.

Dans cet ordre d'idées, parmi les expériences marocaines, on cite l'exemple des pactes négociés développés par les Ait Zekri, la fraction Ouzighimt (tribu Mgouna), fraction Ait Hamd (Mgouna) dans la région de Ouarzazate.

Mots-clés : Charte, Conflits, Coutume, Droits d'usage, Négociation, Terres collectives.

The Effects of Land Cover Change on Sustainability: Human Security and Environmental Change in Semi-Arid Ecosystems

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The links between Environmental Change (EC), seen as a destabilizing interference in the ecosystems equilibrium, on the one hand, and the outbreak of violent conflicts, on the other, remain ambiguous and very complex. Up to date, there is a gap in the researches that focus on the intersections between global EC and human security based on Land Use/ Land Cover (LU/LC) changes. In reality, LC patterns play an important role on EC detection studies, where they reflect the underlying natural and social processes, thus providing essential information for modelling and understanding many phenomena on the earth, including the complex interactions between global EC and human activities. Given the history of South Kordofan of Sudan, as a case study, the communities there live in fragile and unstable conditions, ethnic and religious fractionalization, the geography of the area, as well as the ethnic and political conflicts, makes them more vulnerable to the risk of violent conflict and environmental change's effects. Unfortunately, the EC in the area based on the interaction of these factors could aggravate territorial and border disputes, complicate conflict resolution and mediation processes in the future, in addition to hindering the process of development in the region. To address this shortfall of data, the study will examine the interplay between environmental factors, human security, and conflict. It will focus to analyze the spatio-temporal remotely sensed data in relation to the heterogeneous factors, which affect local ecosystem services of this region, specifically of those systems in poor condition under EC. It also outlines some of the actions being taken to help a country adapting

to the EC, and makes recommendations for how such actions could become more effective. A series of temporal satellite data (i.e. Landsat imagery) was used to study the LC changes in the study area for the past decades. Moreover, high resolution Digital Elevation Model data was applied to gather the spatial characteristics of the region. Furthermore, semi-structured interviews of household heads and Rapid rural appraisal, with focus on group discussion and key informants techniques, were applied, to address the demographic and LU/LC changes. The qualitative and quantitative techniques were used to analyze the socio-economic data. The Geographic object-based classification based on a developed model of integrated multi features was utilized. Furthermore, Post Change Detection technique was applied to quantify and locate the changes. The study showed that, the pressures imposed resulted in the complex of spatial and temporal interactions within topographical systems at South Kordofan, where it has led both to a new rapidity and depth in rural transformation, and a significant impact on urban area as well. These intensive changes may have implications for future ecosystem functions, over a wide array of various spatial and temporal scales. More information exchange is needed to inform actors and decision makers regarding specific experiences, capacity gaps and knowledge to address the EC.

Keywords: Environmental Change, Semi-arid ecosystems, LU/LC changes, Temporal satellite data, Geographic object-based classification, New strategies

PLENARY SESSION 7 | SESSION PLÉNIÈRE 7

The Common Heritage of Mankind (CHM): Developed States Vs Developing States Visions

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Our Common Heritages of Mankind (CHM) are global climate, oceans, seas, water, forests, atmosphere, ozone layer, outer space, biological

diversity, genetic resources etc. The use of CHM should benefit all human societies across the globe. There are certain problems in recognizing a common vision about the notion and the practice of the CHM, so it's very important to think and (re) think the common in a world marked by globalization and conflict of interests between actors and economic strategies.

Several African states support the view that CHM is a Cogens Norm in the international law (that the concept had become part of customary international law), so it's necessary to enforce a strict regulation. However, several liberal countries think only about the free market mechanism (the invisible hand and the absence of State intervention) in order to exploit the South natural resources in which developing countries could only exercise limited sovereignty over their resources.

We are living in the era of globalization, which is conditioned by privatization, deregulation of all common heritages. The transnational corporations (TNC's), the most successful and influential, use the capital and economic power to decrease the role of states in enforcing and monitoring compliance with "Environmental Hard Law". The question is how to manage and administer the CHM and how to protect the needs of global humanity? In this essay, we can design a picture to the conflict of interests between the North and the South, and then we will look for a solution to sharing responsibility and burdens. In conclusion, we will focus on the shift from Laissez faire, Laissez passer and free trade ideology to command and control environmentally destructive activities in order to limit the damage.

البناء العلمي التاريخي والاجتماعي لمفهوم الأنثروبوسين

The Historical and Social Construction of the Concept of Anthropocene

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عرف نحت مفهوم الأنثروبوسين على المستوى الأكاديمي والعلمي لحظات ضعف وقوة، إرتبطت تلك اللحظات بالسياقات الأبيستمولوجية للمجموعات العلمية وكذلك بالتجاذبات السياسية

الدولية. ولكن هذا المفهوم أصبح من خلال الاستعمالات الاعلامية والسياسية مفهوما ذا حمولة مطاطة يتم إستعماله من طرف مختلف الفاعلين الاجتماعيين والسياسيين، إن على المستويات المحلية والوطنية وكذلك الدولية للرفع من خطورة الوضع الانساني الذي أنتجه، وذلك من خلال تغييره وتأثيره السلبي على التوازن البيئي الى درجة أن أصبح قوة جيولوجية تهدد الارض ومن عليها.

كلمات مفتاحية: الانترنتوبوسين- المجموعة العلمية - البناء العلمي للمفهوم - البناء الاجتماعي للمفهوم - السياق التاريخي

When Environmental Inequalities Lead to Social Inequalities!

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Ecological conditions have a large-scale impact on the social and everyday dimensions of individuals. Because, the degradation of our planet and its eco-system are mainly related to industrialization, which has benefited economically for some, and degrade the quality of life for others. This situation of inequality - those who polish less, suffer more - grows more and more by creating deep gaps between populations, which challenge the public authorities who will be required to mobilize significant resources in a desperate attempt to find a balance. These are new issues for public policy and, as a result, create a new conceptual, strategic and operational framework to overcome the effects of this state. However, the fight to create equal opportunities, where each individual should benefit from sufficient conditions, in a healthy environment conducive to human development, still seems long.

Achieving equality, sometimes, requires breaking certain rules. The socio-ecological dimension and ecological equity should not go in the same direction, unlike what is happening now. Will we one day see a policy of voluntary reduction, by States and individuals, of their natural resources in the name of a better distribution of wealth between people? The answer to this dilemma may well be the search for efficiency and effectiveness in action. Currently, the strategy adopted is limited to the

protection and survival of the earth, with incomplete and ineffective actions.

In this article, we will try to analyze following 3 dimensions: the social dimension of ecology, equity and environmental justice. The encounter between these three dimensions can be a source of difficulty, given the divergence of actors' interests and according to their authority. A coherent and humanist position of these dimensions should open tracks for reflection in order to achieve efficiency, preserving the environment and human development in a state of equilibrium.

Keywords: Ecological crises, Ecological equity, Environmental justice, Sustainable development

La gestion de crise lors des catastrophes naturelles : une analyse de la littérature

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Depuis toujours, plusieurs régions du monde ont subi les foudres inattendus des catastrophes naturelles, entraînant des pertes humaines, la destruction des infrastructures et la dégradation de l'environnement. Dans ce sens, différentes recherches et travaux ont démontré que la mise en place d'un plan de gestion de crise est une nécessité pour faire face aux catastrophes naturelles, gérer efficacement ce type de risque et retourner le plus rapidement possible à une situation normale. Cette contribution a pour objet d'examiner en profondeur la littérature consacrée à la gestion des crises face aux catastrophes naturelles.

Mots-clés : Crise, Catastrophes naturelles, Stratégie de crise, Gestion des catastrophes naturelles, Plan de poursuite des activités.

In Quest of Reducing the Environmental Impacts of Wiring Harness Production with Using LCA Method

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Environmental impact assessment methods are now widely used in order to measure environmental impacts associated with human activities (for products, services, and systems). Life-cycle assessment (LCA) is without doubt the foremost assessment method to identify and quantify the process flows and systems that are major contributors to environmental degradation. LCA has major roles in environmental impact assessment, integrated waste management and pollution studies. The aim of this work is to allow the evaluation of the environmental impacts related the production of wiring harnesses.

The realization of this orientation is to compare the pressure of this product on resources and the environment throughout its life cycle, from the extraction of raw materials to its end-of-life treatment. All the inputs and outputs occurring in the life cycle of the system are inventorying to perform a quantitative description of all flows and materials and energy across the system boundary either into or out of the system itself. The goal of LCA is to compare the full range of environmental effects assignable to products and services by assessing how these material flows affect the environment. This information is used to improve processes, support policy and provide a sound basis for informed decisions.

Keywords : Life Cycle Assessment, Waste Management.