WSF 2018

The 7th World Sustainability Forum

19 – 21 September 2018, Beijing, China

Program and Abstract Book

Academic Conference Services

sciforum

What is Sciforum?

Sciforum is an event planning platform that supports open science by offering the opportunity to host and participate in academic conferences. It provides an environment for scholarly exchange, discussion of topics of current interest, building of networks and establishing collaborations.

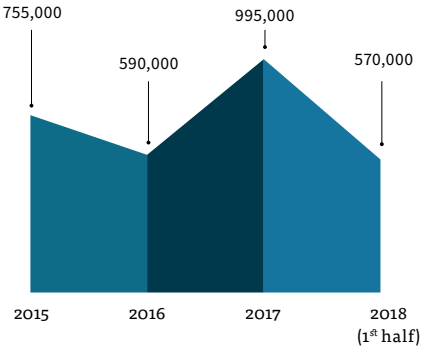
The Benefits of Sciforum

Sciforum helps conference organizers to run online and physical conferences efficiently.
The organizers reduce their administrative efforts thanks to an online tool that supports all aspects of conference organization, including setting up and maintaining the conference website, managing the peer-review process, publishing the conference proceedings, handling and coordinating the conference schedule, registration, billing, sponsors, increasing ROI, etc.

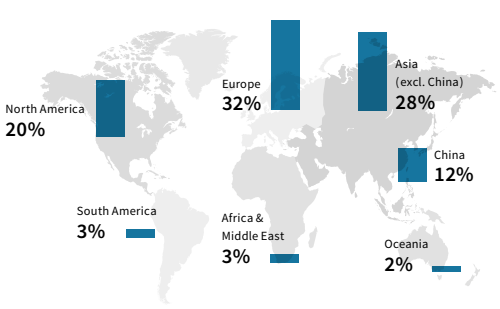
We are here to help you to

- Set up your conference website
- Handle abstract & full paper submission and peer review
- Handle online registrations and billing
- Build your conference program & schedule, record the conference income & expenses
- Build customized mailing lists
- Have access to useful data from your conference (participants list, registration details, book of abstracts, etc.)
- Copy-edit, manage & publish your conference proceedings
- Manage Awards & post event surveys

Sciforum Page Views



Geographical Distribution of Sciforum Users



Number of Conferences Hosted in Sciforum

Sciforum Conference Service Fees

Currently, we offer two options on the Sciforum platform: a managed service (website, submissions, registrations, and billing are fully or partially managed by Sciforum Staff) and a self-service option (website, submissions, registrations, and billing are fully managed by yourself, Sciforum Staff provides support in case of questions).

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If partnering* with MDPI	**0** CHF / conference
If not partnering with MDPI	**2,000** CHF / conference

You can also select any additional services from the "Managed Service" column and add them to your "Self-Service" event.

* To qualify, organizers must run a conference Special Issue related to the conference topic in one of MDPI journals. The organizers must announce the Special Issue on the conference homepage and in all communications related to the conference. The selected journal must appear as one of the main sponsors of the conference.

Managed Service

Website Set-up	**1,000** CHF
Handling of Registrations	**55** CHF / Registrant
Call for Participants	**300** CHF / 500 Invitations
Design Work	**1,140** CHF
Editing Book of Abstracts	**500** CHF / 100 Pages
DOI Registration	**5** CHF / DOI

Each point is subject to specific conditions and apply to Academics only. For commercial purposes please contact us for a quotation.

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WSF2018 is the 7th World Sustainability Forum
Links to the websites of the previous editions:
WSF2017 is the 6th *World Sustainability Forum*
WSF2015: http://sciforum.net/conference/wsf-5
WSF2014: http://sciforum.net/conference/wsf-4
WSF2013: http://sciforum.net/conference/wsf3
WSF2012: http://sciforum.net/conference/wsf2
WSF2011: http://sciforum.net/conference/wsf

Welcome from the Chair of the 7th World Sustainability Forum

The adoption of the 17 United Nations Sustainable Development Goals and the 2030 Agenda for Sustainable Development in September 2015 was accompanied by what insiders considered an optimism they have not experienced in relation to UN resolutions before. The relative efficiency in the drafting, the absence of trenches between East and West, or between North and South, and the unanimity of support of the 193 countries speak volumes. In stark contrast, sustainability and dealing with it could be the poster child for what Robert Horn called a social mess (2007: 6): “a set of interrelated problems … resistant to analysis and, more importantly, to resolution.” Characteristics of a social mess generally, and sustainability specifically, include an absence of a unique and correct solution, interrelatedness of problems, ideological constraints, multiple possible intervention points, resistance to change, value conflict, and political and economic constraints. While these are excellent ingredients for a thorough academic debate, the issues underpinning the sustainability debate are so urgent that, beyond academic reflection, much more is necessary than what academics, political leaders, administrators, industry, nations, communities, and individuals are habitually prepared to do.

The *7th World Sustainability Forum* in Beijing in September 2018 is an excellent opportunity for researchers, practitioners, and policy makers to engage with this topic, to expose the urgency of the issues, and to recognize individual, collective, and national opportunities associated therewith. The WSF2018 in China is also an excellent opportunity to sensitize researchers toward differences in national context and culture, and how considerable progress on sustainability can be made, despite the multitude of challenges and differences around the world.

Mr. Zukang Sha
Former Chinese Ambassador to the UN and
Honorary Chairman of IGEA, Beijing, China

Acknowledgments

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Climate

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Land

Water

World Sustainability Forum

Supporting Agency

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Center for China & Globalization

sustainability

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Message from the Editor-in-Chief

I encourage you to contribute a research or comprehensive review article for consideration for publication in *Sustainability*, an international open access journal which provides an advanced forum for research findings in areas related to sustainability and sustainable development. The journal publishes original research articles, reviews, conference proceedings (peer reviewed full articles) and communications. I am confident you will find the journal contributes to enhancing understanding of sustainability and fostering initiatives and applications of sustainability-based measures and activities.

Author Benefits

- **Open Access** Unlimited and free access for readers
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Aims and Scope

Our aim is to encourage scientists to publish their experimental and theoretical research relating to natural sciences, social sciences and humanities in as much detail as possible, in order to promote scientific predictions and impact assessments of global change and development.

Subject Areas

- Defining, quantifying, measuring and monitoring sustainability
- Sustainable utilization of resources such as land, water, atmosphere and other biological resources
- Effects of global climate change on development and sustainability
- Sustainable chemistry
- Health-related aspects of sustainability
- Developments in cultural diversity, tradition, social systems, globalization, immigration and settlement, and their impact on cultural or social sustainability
- System analysis methods, including life cycle assessment and management
- Education and awareness of sustainability
- Policies and laws relating to sustainability

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Organizers

IGEA

Founded in the United States in 2010, IGEA is a professional international organization whose mission is to promote the development of a global green economy. Led by Maurice F. Strong, eight-time Deputy Secretary-General of the United Nations and CEO of UNEP, IGEA is devoted to making a difference in the world through the collaboration of business and environmental leaders. IGEA's secretariat headquarters are in Beijng, China, and branches have been established in the U.S.A., Germany, Japan and Canada. IGEA aims at boosting the construction of an international green economy while maintaining sustainable economic development. We are dedicated not only to the greening of the industrial economy, but also to assisting businesses in sharpening their competitive edge. IGEA has committees of more than 500 experts and advisors employed in fields such as agriculture, alternative energy, and environmental protection. IGEA offers a six-sided approach to help its members grow and improve: policy consulting, technology exchange, market networking, investment consulting, expert committees, and brand recognition. A U.N. counselor, IGEA is a member of the U.N. Economic & Social Council and the U.N. Global Contract Organization.

University of Intrernationa Business & Economics

The University of International Business and Economics (UIBE), situated in the northeast of Beijing, was founded in 1951. UIBE is a national key university jointly-sponsored by the Ministry of Education and the Ministry of Commerce, and is the top university in the fields of economics and business. UIBE has a total enrollment of over 16,000 full-time schooling students including more than 3,200 international students from above 130 countries.

Tsinghua University Beijing China

Tsinghua University was established in 1911, originally under the name "Tsinghua Xuetang". The school was renamed "Tsinghua School" in 1912. The university section was founded in 1925. The name "National Tsinghua University" was adopted in 1928. The faculty greatly valued the interaction between Chinese and Western cultures, the sciences and humanities, the ancient and modern. Tsinghua scholars Wang Guowei, Liang Qichao, Chen Yinque and Zhao Yuanren, renowned as the "Four Tutors" in the Institute of Chinese Classics, advocated this belief and had a profound impact on Tsinghua's later development. Since China opened up to the world in 1978, Tsinghua University has developed at a breathtaking pace into a comprehensive research university. At present, the university has 14 schools and 56 departments with faculties in science, engineering, humanities, law, medicine, history, philosophy, economics, management, education and art. The University has now over 25,900 students, including 13,100 undergraduates and 12,800 graduate students. As one of China's most renowned universities, Tsinghua has become an important institution for fostering talent and scientific research.

Center For Internationa Business Ethics, CIBE

The Center for International Business Ethics (CIBE) is a non-governmental organization established in 2004, and hosted by the University of International Business and Economics (UIBE), Beijing, China. CIBE specializes in bridging academic study with business practice with a particular focus on ethical strategy and performance.

CIBE aims at creating positive impact on the society with value and knowledge through research, teaching and action in the field of business ethics.

University of Basel

The university opened with a mass held at Basel Minster on 4 April 1460. It has undergone dynamic development ever since it's Inception. During the first year following its founding, the University Register in Basel listed 226 students and lecturers. Today, the seven faculties at the University of Basel have around 13,000 students and over 350 professors.

water

IMPACT FACTOR 2.069

an Open Access Journal by MDPI

Editor-in-Chief
Prof. Dr. Arjen Y. Hoekstra

Message from the Editor-in-Chief

The relevance of water in human development and sustaining life fuels general and scholarly interest in the world's water resources. A better understanding of all aspects of water and its relation to food supply, energy production, human health, and the functioning of ecosystems is key in managing this precious resource in a sustainable, efficient and equitable manner. *Water* invites authors to provide innovative original full articles, critical reviews and timely short communications. We ensure a critical review process and a quick turnaround between submission and final decision.

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Aims and Scope

Water (ISSN 2073-4441) is an international and interdisciplinary open-access journal covering all aspects of water, including water science, technology, management and governance. It publishes original research papers, critical reviews and short communications. There is no restriction on the length of the papers.

Full methodical and/or experimental details must be provided for research articles. We encourage scientists to publish their research in as much detail as possible. Computed data or files regarding the full details of the experimental procedure or model set-up, if unable to be published as part of the main manuscript, can be deposited as supplementary material.

- Water Management and Governance
- Hydrology & Hydraulics, Water Scarcity, Flood Risk & Water Quality
- Water & Wastewater Treatment
- Urban Water Management
- Water Footprint Assessment
- Water in relation to Food, Energy & Human Development
- Water and Ecosystems

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1. GENERAL INFORMATION

1.1 Conference Venue

The University of International Business and Economics (UIBE), situated in the northeast of Beijing, was founded in 1951. UIBE is a national key university jointly-sponsored by the Ministry of Education and the Ministry of Commerce, and is the top university in the fields of economics and business. UIBE pursues to be an outstanding national university and a prestigious international university with its distinct characteristics. After over sixty years' development, UIBE has already become a multi- disciplinary university specialized in the fields of economics, management, liberal arts, law and science, and competitive in the subjects such as international trade, law, finance, business management and foreign languages. At present, UIBE offers over 50 majors to overseas students for bachelor, master and doctoral study. Among them, about 20 majors can be entirely offered in English.

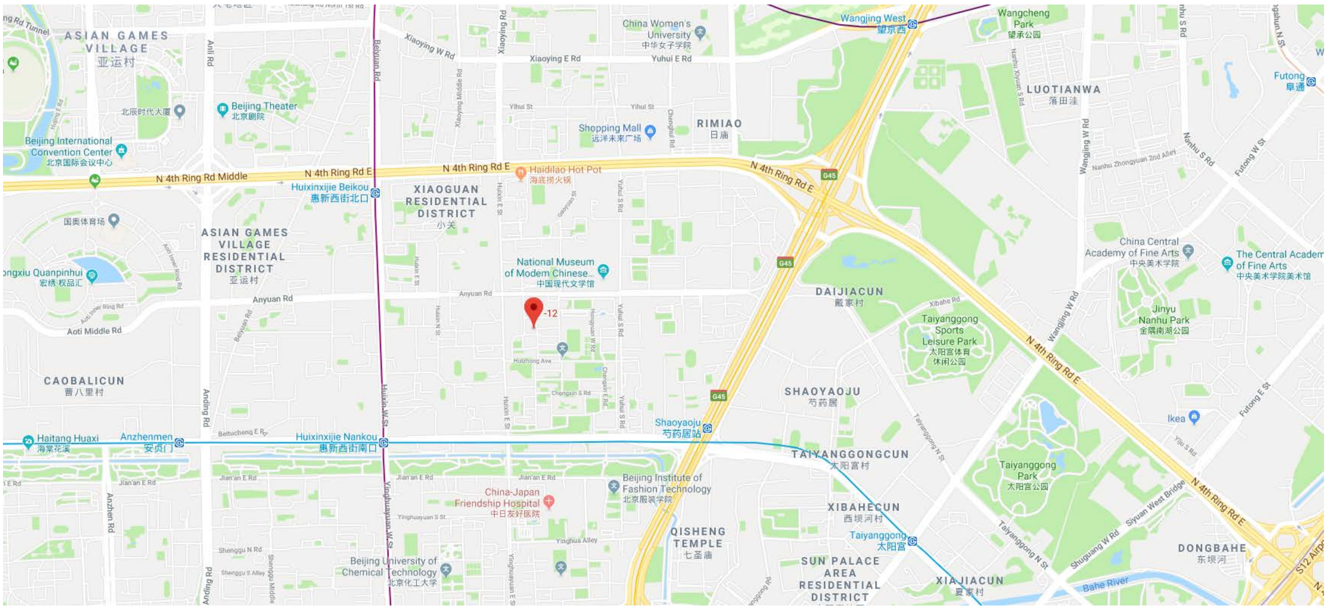
Chengxin Building. The building is one of the most time-honored buildings in the university and was erected when UIBE was built. Chengxin Building mainly contains teachers offices and many meeting rooms. The Dean's Office is located on the 6th floor and students can go there to get advice and help concerning courses and credits. The international meeting room, one of the most important meeting rooms for holding large events, is on the 3rd floor of this building.

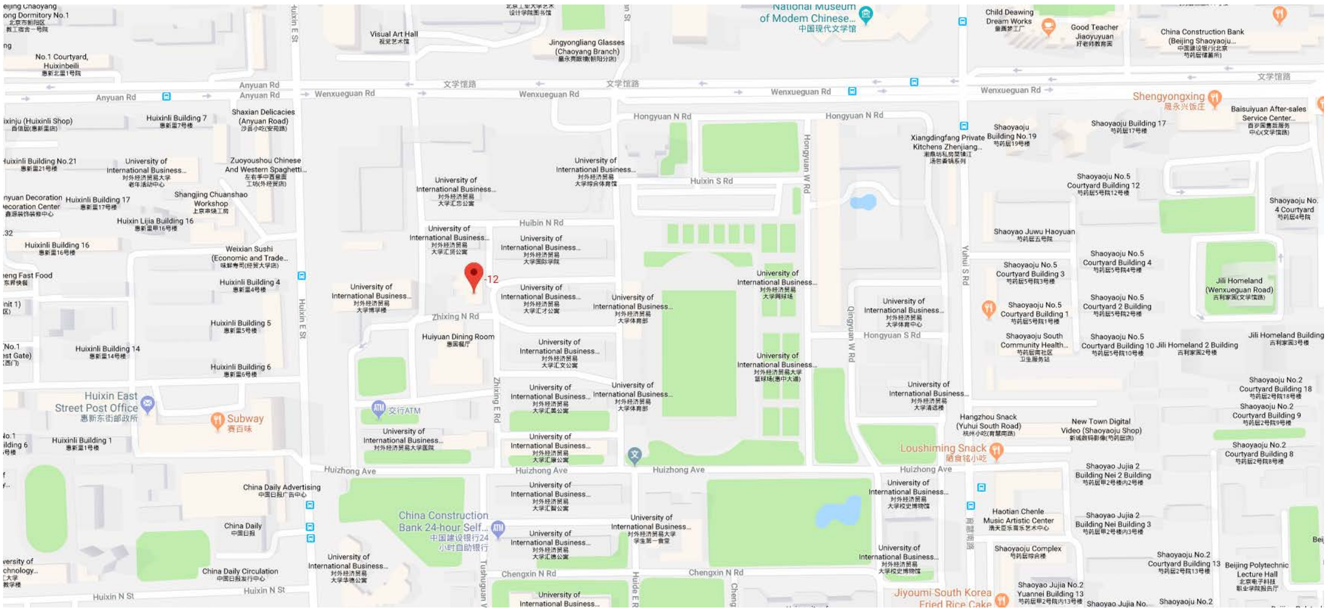
For 'Lost and Found' items, pleasecontact the registration desk staff.

Venue Address:

University of International Business and Economics
10 Huixin East Road Chaoyang Dist. Beijing)
对外经济贸易大学
北京市朝阳区惠新东街10号

1.2 Location


ASIAN GAMES VILLAGE
亚运村
Beijing Theater
北京剧院
Beijing International Convention Center
北京国际会议中心
N 4th Ring Rd Middle
N 4th Ring Rd E
Huixinxijie Beikou
惠新西街北口
XIAOGUAN RESIDENTIAL DISTRICT
小关
ASIAN GAMES VILLAGE RESIDENTIAL DISTRICT
亚运村
China Women's University
中华女子学院
Xiaoying E Rd
Shopping Mall
RIMIAO
日庙
Haidilao Hot Pot
海底捞火锅
Wangjing West
望京西
Wangcheng Park
望承公园
LUOTIANWA
落田洼
Futong
阜通
National Museum of Modern Chinese...
中国现代文学馆
Anyuan Rd
DAIJIACUN
戴家村
Taiyanggong Sports Leisure Park
China Central Academy of Fine Arts
中央美术学院
The Central Academy of Fine Arts
Jinyu Nanhu Park
金隅南湖公园
CAOBALICUN
曹八里村
Aoti Middle Rd
SHAOYAOJU
芍药居
Shaoyaoju
芍药居站
Ikea
Haitang Huaxi
海棠花溪
Anzhenmen
安贞门
Huixinxijie Nankou
惠新西街南口
TAIYANGGONGCUN
太阳宫村
Taiyanggong Park
太阳宫公园
China-Japan Friendship Hospital
中日友好医院
Beijing Institute of Fashion Technology
北京服装学院
XIBAHECUN
西坝河村
Taiyanggong
太阳宫
QISHENG TEMPLE
七圣庙
SUN PALACE AREA RESIDENTIAL DISTRICT
XIAJIACUN
夏家村
DONGBAHE
东坝河
Beijing University of Chemical Technology
北京化工大学
Bahe River
N 4th Ring Rd E
S12 Airport


National Museum of Modern Chinese...
中国现代文学馆
Visual Art Hall
Anyuan Rd
Wenxueguan Rd
Hongyuan N Rd
Shengyongxing
Huixin S Rd
Huibin N Rd
Zhixing N Rd
Huiyuan Dining Room
Huixin East Street Post Office
惠新东街邮政所
Subway
赛百味
Huizhong Ave
China Construction Bank 24-hour Self...
Loushiming Snack
Chengxin N Rd
Jiyoumi South Korea Fried Rice Cake
Hongyuan S Rd
Huixin N St

1.3 Registration Desk Times
The registration desk willl be open the whole conference.

1.4 Wireless Internet Access and Login
Details will be supplied at the Registration Desk.

1.7 Conference Dinner
Details will be supplied at the Registration Desk.

1.8 Audio Visual Presentations
Presentations should be handed to the Audio Visual staff on a memory stick/flash drive in the various meeting rooms, during the break prior to your talk. Please inform the technician in the venue if your presentation has sound or video clips.

1.9 Language
Conference presentations will be simultaneously translated between Chinese/Mandarin and English.

1.10 Emergecy Contact Numbers
Useful Phone Numbers in Beijing:
https://www.travelchinaguide.com/cityguides/beijing/beijinginfo.htm

110	Police
119	Fire
120	Ambulance
6513 0828	Tourist Hotline
6601 1122	China International Travel Service

1.11 Accomodation
The Beijing Huiqiao Hotel (Beijing Huiqiao Fandian) is located near the Beijing Asian Games Village, the China-Japan Friendship Hospital and only a ten-minute drive from the China International Exhibition Center.

Beijing Huiqiao Hotel
19 Huixin E St, Chaoyang Qu, Beijing Shi, China, 100029
Tel: +86 10 6491 8811
Web: http://www.huiqiaohotelbeijing.com/

Crowne Plaza Hotel Sun Palace is conveniently located at the Beijing Chaoyang district in the centre of the Lido area, it affords an easy commute to other parts of the city.

Crowne Plaza Hotel Sun Palace
Yunnan Dasha, North-East Corner of Taiyanggong BridgeXibahe, North-East 3rd Ring Rd, Chaoyang District , Beijing
Tel: +86 10 6429 8888
Email: info@cpsunpalace.cn

Stay at your Chinese friends'or relatives'homes

If you have Chinese friends or relatives living here, and you want to stay with them, you should register at the local public Security Bureau and let them know you are there, you can also register with the local Housing Committee Jug Wei Hui (there is one in every residential area.). It may sound a little troublesome, having to register with the police or the local Housing Committee, but it is better to let them know than for them to find out themselves. If you don't register, it could present problems for you or the people you are staying with.

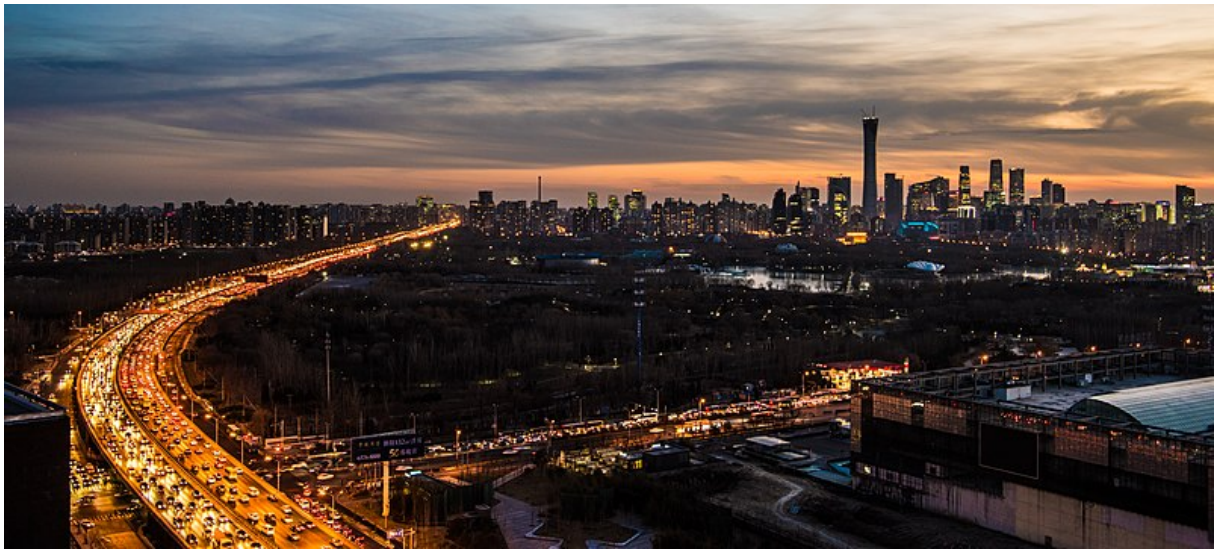
1.12 Beijing

The conference will take place in Beijing. Beijing is the capital of the People's Republic of China and the world's third most populous city. As a city combining both modern and traditional architecture, Beijing is an ever-changing megacity rich in history but also truly modern, exemplified in its global influence in politics, business & economy, education, history, culture, language, music, sporting, architecture, civilization, fashion, art, entertainment, innovation, and technology. Beijing is the second largest Chinese city by urban population after Shanghai and is the nation's political, cultural, and educational center.

Beijing Municipality is surrounded by Hebei Province with the exception of neighboring Tianjin Municipality to the southeast; together the three divisions form the Jingjinji metropolitan region and the national capital region of China.

Map of Downtown Beijing:https://www.travelchinaguide.com/images/map/beijing/beijing-map.gif

Useful Maps of Beijing: https://www.travelchinaguide.com/cityguides/beijing/beijingmap.htm



1. Beijing skyline from northeast 4th ring road of Beijing CBD, Chaoyang Park, and east 4th ring road at dusk. (Picrazy2)

1.13 Airport Transfers and Tours

For airport transportation visit the airport site: http://en.bcia.com.cn/traffic/
For information or to book airport transfers or tours contact Beijing Car Service.

http://www.beijingcarservice.com/?gclid=EAIaIQobChMI_Lu2mN_u3AIVExsYCh3J0Q91EAAYAyAAEgKMvfD_BwE

Email: Bookings@BeijingCarService.com

Tel: (+86) 755 2595 1800,

Various tour options are also available on the site:
http://www.beijingairporttransfers.com/?page_id=11325

Public Transportation
Subway: https://explorebj.com/subway/

1.14 Currency and Banks

China's currency is the Renminbi (RMB), meaning "People's Money" and is issued by the People's Bank of China.China's main unit of currency is the yuan (元)[CNY]. One yuan is sub-divided into 10 *jiao* (角), and one *jiao* into 10 *fen* (分). *jiao* and *yuan* are usually referred to colloquially as *mao* and *kuai* respectively. It is becoming increasingly rare now to receive any fen in your change. The largest denomination renminbi note is the red 100-yuan note.
The best place to exchange foreign currency in Beijing is the Beijing airport's arrival area**:** just before you exit the arrivals gate and enter the terminal. On the side there is a Bank of China**.**
This Bank of China booth does not charge for travelers' check and does not charge other fees for the transaction. It is also open 24-7, 7 days a week.

Once you step out of the arrivals gate there are extra charges for exchange at all banks**,** including the Bank of China. Banks in China will exchange foreign currency Monday to Friday only, not on the weekends. All banks are open 7 days/week but will not do a foreign exchange transaction.

ATMs are widely available**,** although only some will work with international cards. Look for machines with your card system's logo. Bank of China machines accept most international cards and seem to be reliable and easy to use.

Exchange rates and fees are controlled and the same everywhere within China, so usually it is the easiest way to change money at the airport or in your hotel. There are several major Chinese Banks and they are open 24 hours a day.

Save receipts as these are needed to change Renminbi (yuan) back into foreign currency. Without the receipt WHERE and HOW you got the Yuan, they will not exchange your country's currency for you.

To sum up, money exchange in the business halls of banks in China charges no commission fees, but they only work for you from Monday to Friday, 09:00- 16:00. A commission is charged by the ATMs and hotels for money exchange, but they work for you 24 hours any day.

Note that many areas of China and smaller cities do not accept credit cards nor travelers checks and will only accept RMB. You need cash.

1.15 Traveller's Cheques

In China, traveler's cheques are not widely accepted. They can only be used in some international department stores, shops selling luxury goods, and five-star hotels. Credit cards are more acceptable. However, foreign visitors can have traveler's cheques exchanged in the entitled Chinese banks, such Bank of China, Industrial and Commercial Bank of China, Bank of Communications, Citibank, and Agricultural Bank of China
In addition, when passing through Chinese Customs after you land in China, traveler's cheques are more convenient than cash. According to Chinese entry regulations, visitors must declare their cash in Chinese currency exceeding CNY 20,000, or that of foreign currency worth over USD 5,000. No such regulations apply to traveler's cheques, however.

1.16 Taxi Services

Metered taxi in Beijing start at ¥13 for the first 3 kilometres (1.9 mi), ¥2.3 Renminbi per additional 1 kilometre (0.62 mi) and ¥1 per ride fuel surcharge, not counting idling fees which are ¥2.3 (¥4.6 during rush hours of 7–9 am and 5–7 pm) per 5 minutes of standing or running at speeds lower than 12 kilometres per hour (7.5 mph) . Most taxis are Hyundai Elantras, Hyundai Sonatas, Peugeots, Citroëns and Volkswagen Jettas. After 15 kilometres (9.3 mi), the base fare increases by 50% (but is only applied to the portion *over* that distance). Different companies have special colours combinations painted on their vehicles. Usually registered taxis have yellowish brown as basic hue, with another color of Prussian blue, hunter green, white, umber, tyrian purple, rufous, or sea green. Between 11 pm and 5 am, there is also a 20% fee increase. Rides over 15 km (9 mi) and between 23:00 and 06:00 incur both charges, for a total increase of 80%. Tolls during trip should be covered by customers and the costs of trips beyond Beijing city limits should be negotiated with the driver. The cost of unregistered taxis is also subject to negotiation with the driver.

The payment may be by cash, Beijing Transportation Smart Card, Wechat, Alipay and UnionPay, but not on international debit card and credit card like Visa card and MasterCard cannot work.

How to recognize a legal taxi in Beijing? Any advice on illegal tour bus?

1. The taxi plaque number starts with the number "B"
2. The taxi should be equipped with the light on the top and meter measuring.
3. It's better to take a taxi on the road instead of a taxi waiting somewhere. The empty taxi must show a red light in the front window.

NOTE It is EXTREMELY difficult for white foreigners to hail a taxi in Beijing, this is due to a) the official fares being fixed artificially low, so there is an undersupply of taxis, b) taxi drivers expect foreigners to have trouble explaining their destination and can't be bothered with it and c) many Chinese booking their taxis with apps and all kinds of other nuances of the taxi system which we can't know about. This is **not** like other cities in Asia where taxis are desperate for fares, quite the reverse. Therefore, if you start walking with the expectation that you'll just be able to grab a cab if you get lost or are running late, you're in for a surprise - it's better to get to know the subway system.

Taxi Despatch Number: +86 010 – 96103
Dial the number to call an official taxi. Extra CNY6 is charged when called over 4h ahead, and normal CNY5 within 4h.

Online Car-Hailing Apps:
Didi, Uber, UCAR Inc., and Shouyue Limousine & Chauffeur offering barrier-free MPVs.
Payment: Wechat, Alipay, UnionPay, Paypal, etc.
Passengers can call a taxi or a private car using these apps. Off peak hours, it is competitive with street price, but reaches twice as much in rush hours, particularly in bustling areas like Wangfujing, Xidan and Sanlitun Bar Street.

energies

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Message from the Editorial Board

Energies is an international, open access journal in energy engineering and research. The journal publishes original papers, review articles, technical notes, and letters. Authors are encouraged to submit manuscripts which bridge the gaps between research, development and implementation. The journal provides a forum for information on research, innovation, and demonstration in the areas of energy conversion and conservation, the optimal use of energy resources, optimization of energy processes, mitigation of environmental pollutants, and sustainable energy systems.

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Aims and Scope

Energies aims to be a leading peer-reviewed platform and an authoritative source of information for analyses, reviews and evaluations related to energy engineering and research.

The journal covers research in energy engineering and sciences, with a strong focus on energy storage and conservation, biomass and bioenergy, renewable energy, electricity supply and demand, energy in buildings, and on economic and policy issues. The journal also welcomes papers on related topics such as energy modelling and prediction, integrated energy systems, energy planning and management, provided such topics are within the context of the broader multi-disciplinary scope of energy.

- Energy Fundamentals
- Primary Energy Sources
- Renewable Energy
- Energy Exploration and Exploitation
- Energy Conversion Systems
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1.17 Electricity Supply

In Mainland China, Hong Kong and Macau, the common power voltage is 220 Volt 50 Hz AC. There are two kinds of sockets widely used in Mainland China: type A and type I. The type A can also accept plugs of type C or F, which are commonly seen in most European countries.

Type A 	In China, this kind of outlets has two holes of the same shape and size. Plugs that match this socket are commonly used in US, Mexico, Canada, Japan, Philippines, Colombia, Thailand, Vietnam, Panama… But you should notice that there is a kind of two-blade plug with one end larger than the other. They can't be used in China without an adaptor.
Type I 	Countries like Australia, New Zealand, Argentina, and Fiji use electronic devices of this plug shape. Sometimes, the blade at the top is missed, but it can still function safely in Mainland China.
Type C & F 	This kind of socket is widely seen in most European countries, like Russia, Germany, Denmark, Poland, Finland, France, Sweden, and Spain, as well as South Korea.

1.18 Health

At present, China has no severe infectious disease, so no specific inoculation like malaria vaccine is needed before heading to the country. Anyway, all international travelers should note that yellow fever vaccine is mandatory for people coming from yellow fever prevalent area, including residents of the contaminated areas and travelers who plan to directly head for China from these areas. These people have to present a valid vaccine certificate of yellow fever upon entry as well as their other travel documents.

Air pollution has traditionally been a big problem in Beijing as the Beijing-Tianjin-Hebei area has a lot of industrial production. Tourist are strongly recommend to check hourly and daily reports of air quality index (http://aqicn.org/city/beijing/) to know when a mask is necessary.

1.19 Insurances

The World Sustainability Forum accepts no liability for any personal injury, loss or damage of property belonging to or additional expenses incurred by congress participants either during the congress or as a result of delays, strikes or any other circumstances.

Participants are requested to make their own arrangements with respect to health and travel insurance. Subscription to an insurance plan to protect you from the high costs of illness or accident during your stay in China is a prerequisite for obtaining your visa. You should obtain

adequate travel, health and accident insurance before you depart from your country (e.g. Allianz Business Travel Insurance).

1.20 Security

Overall, Beijing is a very safe city. Violent crime is extremely rare, and it's not a problem to walk at night in urban areas. Beijing also enjoys the reputation of low crime rates in Asia and even the world. Some petty crimes such as pickpocketing do happen, and one should be cautious in shopping areas, tourist sites and public transportation. Despite safe urban areas, some parts of Beijing's suburbs are not safe, because they concentrate almost all severe crimes of the city. They are called "Beijing's corner". Such as the middle western area of Fengtai, the western area of Shijingshan, the eastern frontier of Chaoyang, and the most parts of Daxing (except communities surrounding the metro route). As a tourist, it's unlikely you'll visit these areas anyway and you'd be unlikely to accidentally end up in them. If you did need to go for some reason though, taxi drivers may refuse to take you there.

During the conference, the information desk at the conference and your hotel's concierge will be able to assist you with information on places to visit and the appropriate means of transport.

1.21 Shopping in Beijing

With the further implementation of Tax Refund policy in China, there are more and more tax free stores joining the large group to save money for their overseas customers.

Usually, there is a 'Tax Free' sign hanging in the obvious location of these stores. If coming to visit China, it is recommended to shop at these stores rather than others.

Here are the lists of some tax free stores in Beijing, Shanghai, Shenzhen, Nanjing, Xian, Yunnan, Qingdao, Chengdu, Hainan, Tianjin, Anhui and Fujian.

Shops in China usually are open from 9:00am to 7:00pm, although others until 9:00pm. 'Night Market' may remain open until midnight or even all night during weekdays.

Credit Cards including Master Card, Visa, American Express, JCB, Diners Club, Million, Federal, all are acceptable in most large Chinese department stores. However, cash is more prevalent in China. Be sure to carry sufficient small notes to facilitate buying from street vendors so they won't be required to make change for large notes.

Be aware that some goods are not allowed to be exported from China, including jade carvings, cultural relics, etc. Before your purchase, you must confirm whether it can be allowed to pass the Chinese customs.

1.22 Tipping

In recognition of the good service, tipping waiters and maids in high-level western restaurants, guides and drivers from an organized tour group, as well as bellhops who take your luggage to the room has become gradually accepted as common practice in China as elsewhere in the world. But it is still unnecessary to tip when taking a taxi, hiring a car or dining in Chinese restaurants.

Tipping frequently occurs when you are in a tour group, superior hotel, western restaurant, or somewhere else when you are satisfied with the service. Remember that it is not necessary to tip in roadside eateries, snack stalls or even quality Chinese restaurants. Sometimes the bill in quality Chinese restaurants may have already included about 5% - 15% service charge. Tipping taxi drivers or skycaps is also unnecessary.

For the bellboys or waiters of high-level hotels and western restaurants, 5-30 RMB (1 - 5 US dollars) may be appropriated. If you are uncertain about how much to give, just to tip based on your bill. Generally, 10% - 15% of the bill is the most proper amount. For the tour guide and the driver, 10-70 RMB (1 - 10 US dollars) a day per person is adequate.

1.23 VAT/ Tax Refunds

The refund rate is 11% of the invoice value. However, 2% of the rebates are charged by the rebate agency as service fee.

Therefore, visitors actually enjoy a rebate rate of 9%.

Refunds = Invoice Value (VAT included) x Rebate Rate (11% - 2%)

For instance, if one spends CNY 1000 in a store, CNY 90 (CNY 1000 x 9%) will be returned. The rebates will be given in CNY. If the amount is not beyond CNY 10,000, both cash and bank transfer rebates are allowed. Otherwise, if the amount exceeds CNY 10,000, only bank transfer is allowed.

How to Apply for Rebates:

1. Purchase goods in designated stores with the "Tax Free" sign. Ask for the sales invoice and tax refund form from the clerk.
2. Visit the customs office at the departure port and present the refund form, invoice, passport or ID card as well as the purchased products. If nothing goes wrong, the officer will stamp on the refund form.
3. After, go through the joint inspection, head to the refund counter, have the materials examined and have the rebates back.

Note: Under the condition that all necessary materials are prepared, it takes three to five minutes at the customs office and refund desk respectively. On average, it takes a visitor about 15 minutes to go through all the formalities. However, it's strongly recommended to spare additional 40 minutes to an hour for the whole process.

https://www.travelchinaguide.com/essential/tax-refund.htm

1.24 Weather

Dawn arrives just after 6pm and the sunsets at around 6am.

Beijing's climate is defined as "continental monsoon." The four seasons are distinctly recognizable. Autumn is the best time to be in Beijing; the temperature is mild and the sun is out a lot. In autumn, jeans and a sweater are usually enough. In the warmer months, T-shirts and light pants or shorts are the best bet.

Maximum daytime temperatures range from 15°C to 26°C. There are about 5 rainy days.

1.25 Get a VPN for China

When you visit China keep in mind that their ‘Great Firewall’ blocks sites such as Facebook, Twitter, YouTube, Instagram, and most of the Google selection. If you want to access these while you’re visiting China, you’ll need to purchase a VPN.

When shopping for VPNs, check that they cover China – as many free options do not.

2. CONFERENCE PROGRAMME

19 September 2018	WSF2018 – Sustainable Development Education Forum in China
14:30-18:00	**Sustainable Development – Intergenerational Integration and Innovation**
	1. Keynote Speech **Mingkai Li** – Vice President of JianXin Group、Chairman Inheritor **2. Topic Discussion** To promote the sustainable development through intergenerational integration and innovative development, the discussion will focus on the "intergenerational integration and innovation of entrepreneurship and enterprise vitality", the "intergenerational integration and innovation in education and academic research", and the "sustainable development of young people's green entrepreneurship". Guest: **Baocheng Liu** – University of International Business and Economics **Bowen Gui** – Founder and CEO - Bengege Recycling LLC**,** 2017 Forbes 30 Under 30 China List
20 September 2018	**WSF2018 – Opening Ceremony and Theme Meeting**
09:00-12:00	**1. Welcome Addresses** **Zukang Sha** – Former Deputy Secretary-General of the United Nations; Honorary President of the IGEA, and the Chairman of the Forum **Jeffrey D. Sachs** – Video Message - Director of Sustainable Development Solutions Network (UNSDSN) **Alain Gaschen** – Deputy Head of Mission at Swiss Embassy in China **Jiaqiong Wang** – President of University of International Business and Economics **2. Thematic Report 1: UN Sustainable Development Goals (SDGs) and Ecological Civilization Contruction in China** **Zhenhua Xie** – China's Special Representative on Climate Change; Deputy Director of the CPPCC National Committee on Population, Resources and Environment; and Former Deputy Director of the National Development and Reform Commission **3. Sustainable Development and Entrepreneurship in China's "New Era"** **Zhou Yunjie** – Haier group CEO **Jianxin Li** – Chairman of Jianxin Group **4. High-End Discourse: Sustainable Development and High-Quality Economic Growth** **Guest Host:** Baocheng Liu – University of International Business and Economics **Distinguished Guests:** **Hilton L. Root** – George Mason University **Jacques Pellet** – Special Envoy of the ICRC President on China Affairs, Geneva **Wang Jinnan** – Academician of Chinese Academy of Engineering, Dean of the Environmental Planning Institute of the Ministry of Ecology and Environment **Huanming Yang** – Academician of the Chinese Academy of Sciences, Chairman of The Beijing Genomics Institute (BGI) **Gao Fu** – Academician of the Chinese Academy of Sciences, Director of China CDC **Xue Lan** – Dean of School of Public Policy and Managements, Tsinghua University **Yunfeng Bai** – Chairman of China Power Conservation & Environment Protection Co.,Ltd. Chinese and Foreign Academics, Famous Experts, Representative Firm, etc

20 September 2018	WSF2018 – Special Sessions
14:30-17:30	**Symposium on Urban Sustainable Development** **1. Speech** **Yongtu Long** – Boao Former Secretary General of Asia BBS **Hualin Zhao** – Chairman of the State-owned Assets Supervision and Administration Commission of the State Council **Lin Xu** – Director of National Development and Reform Commission, Center for Urban Development **2. Symposium on Practices of the Concept "Two Mountains" in Urban Development** Five Mayors of China's Local Cities (Lishui and Huzhou in Zhejiang Province, Xiamen in Fuzhou Province, Dexing in Jiangxi Province, etc.) **3. Round Table Discussion** **Topics:** Multinational Companies and Large State-owned Enterprises Green Development BBS**,** New Green Industry and Quality Growth of City GDP **Guest:** **Mayors of China's Local Cities** **Zhengzhong Xu** – Party School of the Central Committee of CPC (China National School of Administration), Deputy Director of Department of Economics, Professor, Tutor for PHD Students **Xiaojun Huang** – Vice President and Managing Director of Veolia China, Beijing Enterprises Group Company Limited, China Energy Conservation and Environmental Protection Group
	Symposium on Agricultural Economic Sustainable Development **1. Keynote Speech** **Yin Chengjie** – Former Executive Vice Minister of The Ministry of Agriculture of the People's Republic of China; The President of Chinese Association of Agricultural Economics **Xiyuan Liao** – Director-general of Ministry of Agriculture and Rural Affairs of the People's Republic of China **Shiyin Bai** – Founder of Guang Li Liang Ke Ji Yan Jiu Yuan Rosalind Leeck, Senior Director of U.S. Soybean Export Council **2.Topic Discussion** **Yin Chengjie** – Former Executive Vice Minister of The ministry of agriculture of the People's Republic of China; The President of Chinese Association of Agricultural Economics **Xiyuan Liao** – Director-general of Ministry of Agriculture and Rural Affairs of the People's Republic of China **Zhanxi Lin** – Director of Fujian Agriculture and Forestry University Institute of JUNCAO Technology **Chunhong Yang** – Researcher of Chinese Academy of Sciences **Shiyin Bai** – Founder of Guang Li Liang Ke Ji Yan Jiu Yuan **Paul Burke** – Director of North Asia U.S. Soybean Export Council

	Nancy Kavazanjian – Director of US Soybean Foundation Well-known Chinese and foreign experts and scholars, green agriculture enterprises, etc.
	Symposium on Bioenergy and Biomaterials Sustainable Development **1. Keynote Speech** **Jingyu Bai** – Deputy Inspector of Department of High Technology Industry of National Development and Reform Commission **Zhaokai Wang** – Academician of the National Academy of Engineering and Chief Scientist of Shenzhen Taili Energy Limited Company **Hongguang Wang** – Vice President of Development Strategy Research Institute of Ministry of Science and Technology **2.Topic Discussion** **Hongguang Wang** – Vice President of Development Strategy Research Institute of Ministry of Science and Technology **Zhaokai Wang** – Academician of the National Academy of Engineering and Chief Scientist of Shenzhen Taili Energy Limited Company Academicians, experts and companies.
	Panel Discussion on Sustainable Development **1. Speech** **Zukang Sha –** Former Deputy Secretary-General of the United Nations; Honorary President of the IGEA, and the Chairman of the Forum **2. Round Table Discussion** **Youfu Xia** – University of International Business and Economics, Director of the Strategic Center for China's Open Economy and International Scientific and Technological Cooperation **Jiayu Hou** – Director of the Institute for Green Development Strategy, China University of Political Science and Law **Li Li** – Associate Researcher, University of International Business and Economics **Edwin Charles Constable** – Vice-rector of the University of Basel, Switzerland **David Lin** – Research Director of the Global Footprint Network **3. Awarding for Sustainable Academic Contributions**
21 September 2018	**WSF2018 – Special Sessions**
09:00-12:00	**Symposium on Green Economy and Healthy Human Habitat** **1. Keynote Speech** **Fu Gao** – Member of the Chinese Academy of Sciences, Director of the Chinese Center for Disease Control **Xiaoguang Xin** – Chairman of International Green Economy Association, The Former Deputy Director of the Energy Conservation and Emission Reduction Office of the People's Bank of China **Bin Tian** – Researcher in Institute of Automation, Chinese Academy of Sciences, Secretary General of Parallel Intelligence Professional Committee of China Automation Society **Ning Li** – Dean of School of Computer Science in Beijing Information Science and Technology University

	2.Topic Discussion The discussion will focus on the development of related science & technology and service industries at green economy and intelligent building, green fresh air, health and epidemic prevention, etc. The meeting will establish the R&D Committee of Passive Green Intelligent System of Fresh Air" **Guests:** **Xiaoguang Xin** – Chairman of International Green Economy Association, The former Deputy Director of the Energy Conservation and Emission Reduction Office of the People's Bank of China **Bin Tian** – Researcher in Institute of Automation, Chinese Academy of Sciences, Secretary General of Parallel Intelligence Professional Committee of China Automation Society **Ning Li** – Dean of School of Computer Science in Beijing Information Science and Technology University **Zhe Liu** – Chairman of Dalian Braun Real Estate Development Co., Ltd. **Zeyun Feng** – Chairman of Naqi Environmental Protection Technology Co., Ltd. **Xinrong Wang** – Chairman of Beijing Wadeng Technology Co., Ltd. **Huaichao Chen** – Chairman of Chongqing Haoqi Energy Technology Co., Ltd
	Symposium on Clean Energy Heating and Sustainable Development **1. Keynote Speech** **Yi Jiang** – Academician of the Chinese Academy of Engineering; Director of Building Energy Conservation Research Center, Tsinghua University **Zhiqiang Xu** – Deputy director of National Energy Conservation Center **Yande Dai** – The Director of China National Energy Development and Reform Commission **Wenyu Duan** – Chairman of Langfang Huayu Tianchuang Energy Equipment Co., Ltd. **2.Topic Discussion** **Wenyu Duan** – Chairman of Langfang Huayu Tianchuang Energy Equipment Co., Ltd. **Jianning Xue** – Deputy general manager of Beijing gas Refco Group Ltd
21 September 2018 Afternoon **Guest will visit the "Best Practices Enterprises of Sustainable Development"** **Proposed:** **Yili Resources Group** **Bishuiyuan Group** **Hanergy Group** **Dongxu Group**	
Note: The outline of the agenda will be gradually optimized according to the demands of all parties, and the implementation agenda will prevail.	

Campus Map of University of International Business and Economics

climate

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Editor-in-Chief
Prof. Dr. Gordon Huang

Message from the Editor-in-Chief

Climate (ISSN 2225-1154) invites you to submit research and review articles, new direction papers, and short communications relevant to climate on all scales. *Climate* was established in 2013 to rapidly publish research results on all aspects of interdisciplinary climate research and has been indexed in the Emerging Sources Citation Index. It has received significant attention and recognition in the scientific community, reflected by substantial increases in the number of papers submitted, published, downloaded, and cited. As Editor-in-Chief, I encourage you to consider to publish your research work in *Climate*.

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Aims and Scope

Climate is an international and open access journal on climate research at all scales. Our aim is to encourage scientists to publish high quality research as quick and much detail as possible.

The scope of *Climate* includes:

- Global, regional, and urban climate and their interplays
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- Impact of climate on short-term extreme events
- Chemistry, aerosol, cloud, and climate interactions
- Hydroclimate
- Interactions of air, land, water, and plant
- Interactions of water-, energy-, and carbon-cycles
- Impact of climate on air/water quality, ecosystem, human health, food production
- Impact of climate on economy and society
- Climate mitigation and adaptation policies and strategies
- Sustainability, clean energy, and pollution control
- Geoengineering

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3. ORAL PRESENTATION ABSTRACTS

1 A Comparative Review of the Sustainable Development Goa (SDGs) : Monitoring Tools, Gaps and Needs

Kai Fang[1, 2], Anqi Xu[1]

[1] School of Public Affairs, Zhejiang University
[2] Institute of Environmental Sciences (CML), Leiden University

United Nations proposed 2030 Agenda for sustainable development in late 2015, which has become a new globally agreed framework and contains better coverage of three dimensions of social, economic and environmental in an integrated way. With 17 goals and 169 targets, the Sustainable Development Goals (SDGs) can provide a synthesized guidance in policy making and implementation, while indicator-based assessments might be the prerequisite and cornerstone of measuring process at all regions and scales. However, since the establishment of the SDGs is relatively short-lived and the intertwined stakeholders are complex, there is still much controversy waiting to resolve, while a few key knowledge gaps and research priorities worth exploring.

Through the review of current research, this paper serves as an introduction of the conceptual framework, research methods, indicator system and regional practice of the SDGs. Then, we identify some challenges and difficulties in using this goal as a guide for improving the human well-being and what is needed to make it a better policy tool in the next practice. Three main problems include: 1) Is environmental sustainability adequately valued in the SDGs? For some scholars argue the SDGs have already payed more attention to environmental dimension while others think it is still neglected 2) What indicators should be chose to effectively assess the SDGs that can address trade-offs and achieve co-benefits at the same time? And 3) how can we measure the process of Agenda 2030 under the background of globalization, with the rise of international trade and the strengthening of relations between countries? Finally, we propose some possible avenues for realizing the ideal result of sustainable development, and the findings will probably provide a more complete picture of a better future.

2 Efficiency Assessment of Public-Private Partnership (PPP) Projects. the Case of Russia.

Andrey Berezin[1], Bruno S. Sergi[2], Natalia Gorodnova[3]

[1] RUDN University
[2] Harvard University
[3] Ural Federal University

The most recent international experience shows that public-private partnership (PPP) is a mechanism that improves the management of public and municipal property in the construction sector. This article proposes a method for ranking countries by the probability of being successful in implementing a PPP. The new methodology is based on a system of indicators to assess the quality of the institutional environment, the experience of project implementation, the state readiness, private organizations, and the society for the effective implementation of PPP projects. We develop a new method to gauge challenging Russia's new legislation that although having been introduced in 2015, it has already boosted a tumultuous number of new PPP projects and it is expected to further enhance PPP opportunities in the country.

3 Green-Competitiveness of Sustainable Development: Examining the Correlation between the Sustainability Index and Its Four Thematic Sectors, Namely, Economy, Equity, Environment, and Enablers, with Inward Greenfield Foreign Direct Investments (FDI) at the Urban and National Levels.

Meera VM

[1] Faculty, Sir J J College of Architecture, Mumbai University, India
[2] Partner at Bees Urban Research, Mumbai, India

Main issues & argument: To address both globalization and environmental challenges, competitiveness and sustainability principles should be integrated into development policy at urban and national levels. In the context of globalization, Foreign Direct Investments (FDI) is considered as a driver of economic growth. Places attracting maximum FDI are considered as competitive. Sustainable development is defined as prosperous, green, equitable growth without negative consequences on the environment. However, the complementarity of sustainability and competitiveness is a matter of debate. Nonetheless, the proliferation of sustainable development concepts like green-city and green-growth is likely to depend upon their competitiveness potential. This desk research examines the FDI-competitiveness of sustainable development statistically at the urban & national levels.
Methodology: This research introduces a comprehensive framework to quantify the sustainability index of a place termed here as *Green-Competitiveness (G-Comp)*. In addition to the three thematic sectors of sustainability, this research proposes a fourth thematic sector, e*nablers,* representing the elements that are increasing the efficiency of the place. Thus, G-comp is a weighted index of more than twenty indicators across the four thematic sectors of sustainability, i.e., e*conomy, environment, equity,* and *enablers*.
To assess the competitiveness of sustainable development, this research examines the correlation of the sustainability index ***G-comp*** and its four thematic sectors with inward greenfield FDI at the urban and national levels. This desk research uses quantitative data for inferential analysis using the multivariate ordinary least-squares (OLS) regression model in STATA. The indexes for G-comp and four thematic sectors are generated using Pena's distance method in 'R'. This research also ranks cities and nations in G-comp and four thematic elements (4Es) as well. A sample of this study includes panel data of 81 global cities (for the years 2004 and 2014) and 132 nations (for the years 2005 to 2014) across five world regions, i.e., Africa, Asia, Europe, and North and South America.
Main findings: This research confirms the positive and significant correlation between the sustainability index 'G-comp' and inward greenfield FDI at the urban and national levels. The thematic element e*nvironment* shows a significant positive correlation with the FDI urban level and negative correlation with FDI at the national level. *Enablers* and e*quity* have a strong negative correlation with FDI at the urban level and a strong but positive correlation with FDI at the national level. *Economy* has a positive correlation with FDI at both the urban and national levels. The 20 indicators of G-Comp display different relationships with FDI at the city and national levels.
In summary, this study confirms that prosperous, green, equitable, and efficient or sustainable places are more FDI-attractive, substantiating the competitiveness of sustainable development. G-comp rankings proposed by this research can be useful for the policymakers to evaluate, compare, and improve the performance of cities and nations in sustainability and its four thematic sectors, i.e., e*conomy, environment, equity, and enablers*.

4 A Conceptual Socio-Ecological Framework for Analyzing Sustainability of Low-Input Ruminant Meat Production Systems in Developing Countries

Tawanda Marandure[1], Kennedy Dzama[1], Godswill Makombe[2], Willem Hoffmann[1], Cletos Mapiye[1]

[1] Stellenbosch University
[2] University of Pretoria

Abstract
The sustainability of the low-input ruminant meat production system is currently not clearly defined. Neither does an appropriate evaluation framework exist that comprehensively encompass the complexity of the system, including, the multiplicity perspectives of producers. The task of evaluating sustainability of the low-input ruminant meat production system require a comprehensive and adaptive co-management process with active participation of all stakeholders including livestock producers. This paper describes a conceptual system-specific framework that can be used to evaluate sustainability of low-input ruminant production systems. The paper also provides detailed guidelines for application of the framework. Basically, the framework is interdisciplinary consisting of five activities namely; extensive literature review, household baseline surveys, stakeholders' meetings, key informant interviews or key expert consultations and field measurements. The five activities feed into the six-stage components of the framework. The framework incorporates the multiple functions of ruminant livestock and the credence values of the grazing ruminants' system in the main evaluation. The proposed framework captures the complexity and interrelationships within and between sustainability components and indicators by applying systems dynamics modelling. Finally, the framework is recommended for application in different geographical locations to validate and give feedback to the framework.

5 A Model to Assess Sustainability Using Multi-Criteria Analysis and Geographic Information Systems

Antonio Boggia[1], Luisa Paolotti[1], Lucia Rocchi[1], Gianluca Massei[1], Francisco Jose Del Campo Gomis[2], Asuncion Maria Agullo Torres[2]

[1] University of Perugia, Italy
[2] "Miguel Hernández" University (Spain)

The aim of this paper is to present a methodology and a computer model for sustainability assessment based on the integration of multi-criteria decision analysis (MCDA) with a geographic information system (GIS). It presents the results of a study for the implementation of a model for measuring sustainability to address policy actions for the improvement of sustainability at the territory level. The aim is to rank areas in order to understand the specific technical and/or financial support that is required to develop sustainable growth.
The sustainable development goals require a measurement of the sustainability trend both at the local and the national level. There is a need for models for the assessment of sustainable development. Assessing sustainable development is a multidimensional problem: economic, social and environmental aspects have to be taken into account at the same time. The tool for a multidimensional representation is a proper set of indicators. The set of indicators must be integrated in a model, that is, an assessment methodology, to be used for measuring sustainability.
The model, developed by the Environmental Laboratory of the University of Perugia, is called GeoUmbriaSUIT. It is a calculation procedure developed as a plugin working in the open-source GIS software QuantumGIS.
The multi-criteria method used within GeoUmbriaSUIT is the algorithm TOPSIS (Technique for Order Preference by Similarity to Ideal Design), which defines a ranking based on the distance from the worst point and the closeness to an ideal point, for each of the criteria used. For the sustainability assessment procedure, GeoUmbriaSUIT uses a geographic vector file where the graphic data represent the study area and the single evaluation units within it (the alternatives, e.g. the regions of a country, or the municipalities of a region), while the alphanumeric data (attribute table), describe the environmental, economic and social aspects related to the evaluation units by means of a set of indicators (criteria). The use of the algorithm available in the plugin allows the user to individually treat the indicators representing the three dimensions of sustainability, and to compute three different indices: an environmental index, economic index and social index. The graphic output of the model allows for an integrated assessment of the three dimensions, avoiding aggregation. The presence of separate indices and graphic output make GeoUmbriaSUIT a readable and transparent tool, since it doesn't produce an aggregate index of sustainability as a final result of the calculations, which is often cryptic and difficult to interpret. In addition, it is possible to develop a "back analysis", able to explain the positions obtained through the alternatives in the ranking, based on the criteria used. The model will be demonstrated through a case study of Spain.

6 A Study on the Commercial business of the Urban Single Households Area Using Big Data

Sooa Kwon[1], Sung-tae Kim[2], Youngsang Kwon[3]

[1] Department of Civil & Environmental Engineering, Seoul National University
[2] Graduate Program in Urban Design, Seoul National University
[3] Professor of Department of Civil & Environmental Engineering, Seoul National University

The ratio of single households in the Seoul, capital of South Korea, has doubled in just 10 years, reaching 30% in 2017. Single household is suffering from various urban social problems, including housing instability, disparity in housing type and demand, social isolation, and economic poverty, but the policy response is insufficient.
This study assumes that the propensity for consumption of single household is different from that of other households, and that these differences affect the local consumption market. Thus, this study analyzes the commercial businesses in the areas where a single household is concentrated and draw out the commercial businesses that are related to a single household.
The spatial scope of the study Gwanak-gu, Seoul, which has the largest ratio (44.9%, 2017) and size of single-person households. The unit of analysis is Dong (the smallest administrative district). The time scope of the study is 2005 - 2015, and was analyzed on a five-year basis. For the analysis data of the study, the " licensing data " of the Local Government Data Open System was utilized. The commercial businesses were selected by referring to the prior research, licensing data, classification of business commercial market information systems. From 2005 to 2015, nearly 10,000 data were used for nine commercial business.
The hypothesis of this study is areas populated by a single household are 1) a large number of convenient industries that can be easily used 2) a large number of commercial businesses that share the work services 3) many leisure and hobby activities to enjoy alone. For the verification of the hypothesis, the study selected disposals, coin laundry, medicine, animal hospital, and physical training. The station area was selected as a dummy control variable.
The research methods are as follows. First, check the correlation between the ratio of single households and nine industries in Gwanak-gu, Seoul. Second, compare the commercial business of average Gwanak-gu with the highest 20 % single households Dong. Third, compare Dong including the station (which concentrate of commercial business) area and not.
The analysis found that the ratio of single households and the number of convenience stores and coin-washing rooms were correlated. On the other hand, while the absolute number of animal hospitals and physical training centers increases due to the increase in the population of pets and hobby activities, it is unlikely to be related to the proportion of lone household households because they are concentrated in the station area.
This study is meaningful in that commercial sector characteristics of single-person areas were analyzed on a regular basis and the vast licensing data of 10 years were used.

7 A Study on the Distributional Characteristics and Factors of Vacant Houses in South Korea

Hyejeong Yoo, Youngsang Kwon

Seoul National University

In recent years, many cities in developed countries have struggled against vacant houses. Empty homes are accompanied by social problems such as vandalism, arson, insanitary environments and collapse risk. They also have negative effects on the value of nearby properties and their local communities. Accordingly, there have been various policy responses to tackle the problems. In spite of the efforts, however, the number of vacant houses is still increasing with population decrease and imprudent developments.

In South Korea, the number of vacant houses has increased since 1990s, and central and local governments started developing plans and policies to resolve the problem from 2010s. However, the legal system to control abandoned houses has no clear criteria for demolition or reuse and most of policies are similar to each other regardless of their various conditions. Consequently, governments' efforts have not led to tangible results so far.

Housing vacancy varies according to regions, its magnitude, surrounding environments or housing types, and it calls for multilateral approaches. Thus, this article aims to identify distributional characteristics of vacant houses in South Korea, categorize them and find out the major factors to cause housing vacancy. We found that there are apparent differences in vacant housing types and the reasons of vacancy between urban and rural regions. In addition, vacant houses are differently distributed even in deprived areas depending on hereafter development plans. Based on the analysis, the ways to manage vacant houses for sustainable development is discussed.

8 Achieving Environmental Sustainability and Participation through Access to Non-Judicial Remedies

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Economic liberalism, which operates through investment bilateral investment treaties, was encouraged by States for developmental purposes with restricted government interference. There was technology transfer, and companies began to operate with the exclusive aim of making profit for sustenance. However, there was little or no initiative to protect the natural environment and human rights from abuse, or to prevent negative externalities. The 2011 UNEP Report on Nigeria Ogoni Land found that environmental damage done on swamp and mangroves, livestock, fisheries, public health, water quality, and land-based vegetation has rendered the region unfit for living, hence the need for environmental accountability, rehabilitation, and restoration.

However, business has not learned how to handle these changes, nor does it recognise the magnitude of its responsibilities for the future of civilization (Pittie, 2002: 50). This paper notes several attempts made through a corporate social responsibility framework that stands as a roadmap for businesses to give back to the environment. This notion, I believe, has been proliferated and creates gaps in the environmental sustainability discourse; in order to remedy these defects, an informal governance mechanism—the non-judicial grievance mechanism—has been invented.

The Earth summit 1992 (UNCED) set the pace on environmental and sustainable development. More than twenty years later, consultations are still on-going for effective remedies for breaches caused by businesses as complementary to compensation. Having thought and developed the complexity of problems facing us, the UNCHR adopted the John Ruggie (protect, respect, and remedy) Guideline 2013. This study posits a blueprint for action on sustainable development, in addition to aid with a most comprehensive and effective framework on a 'remedy' strategy regarding the environment and human rights without compromise. This research seeks to evaluate sustainability through non- state-based, operational, non-judicial grievance mechanisms for the remedy of a business-related environmental abuse-restorative option. It will employ semi-structured interviews, a comparative study, and an empirical approach to investigate which restorative elements can be included in dealing with environmental disputes. This research will in no small measure contribute to knowledge and further give credence to Principle 16 of the Sustainable Development Goals.

9 An Eco-Nest in the Tropical Sunshine

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This project is based on the reuse of waste materials (plastic bottles,car tires, used denim), which are present in huge amounts on waterfronts, polluting the environment and disturbing the serenity of places, disturbing the ecology, and affecting the marine life. The purpose of the project was to develop a sustainable and inexpensive design for houses that will preserve the natural ecology of the place and provide a safe living space for people living permanently on waterfronts against oceanic cyclones and flooding.. The theme behind the project is removing plastic waste from the environment that was introduced by human settlements and reusing it without any extensive and energy-consuming recycling process. An eco-nest is a self-sustained living module designed for a family of 6-7 people; it is designed with plastic bottles as a building unit and the overall structure is lightweight, making it easy to float in conditions of water level rise or seasonal flooding. The site selected for the project was that of Mubarak village, Karachi, Pakistan. It is a fishing community living on the waterfront. They are extremely vulnerable to oceanic cyclones and flooding and there is a chance of permanent sea level rise (environmental study). The settlement has xperienced a huge loss to their economy and livelihood due to seasonal flooding every year (mid-september to mid-october). They have to leave their village and business and migrate to a safe, dry place that damages their livelihood and economy. Tourist from Karachi visitsthis place during pleasant weather and pollute the natural enviornment by disposing of plastic bottles and other waste. The purpose of the project iwa to utilize this plastic waste to create living spaces for the local fishermen that are safe during the seasonal flooding. An extensive study was carried out regarding waste material construction with the help of case studies and projects carried out in other different countries. The result achieved by the study was a small prototype living module that floats on the sea; the new settlment is designed over the water. The new proposed designs forms a floating village consisting of a single module per family connected by decks with other modules, forming a cluster of eight modules. Each cluster is then connected to other clusters with anchors. The fishermen's houses also serve as their boat during floods. All the circulation between the modules and clusters is through decks, whereas movement around the village takes place through boats, making it a "village Venice".The main target was to achieve a clean and safe environment for the people living there and to improve their social and economic situation. This design will provide a safe solution against sea level rise, as the module graually rises with rising water levels, as well as utilizing plastic bottles for a good purpose and reducing the pollution they cause on waterfronts.

10 Architecture for Humanity

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ABSTRACT In the congested cities, the problems of urban sprawl, traffic congestion and pollution have threatened the prospects of biodiversity, greenery, livability and general well- being of the inhabitants. In my report I focused the condition of Pakistani Gypsies, Pakistan is home to a significant proportion of the world's poor. Almost a quarter of the country's 158 million people survive beneath a poverty line. When people migrate to urban areas they don't have proper shelter to cover themselves and they try to have their own shelters and which result in formation of new slum. Growth of population and needs extends with the passage of time. As the population rate exceed day by day specially in Pakistan. The main causes are illiteracy, corruption, lack of unstable governments, and injustice. As the population increases with the passage of time, the demand for income, jobs and appropriate living spaces increase. That's why poor people travel from place to place in search of jobs or other sources of income to fulfill their family needs. It's important to build such towns which enhance the quality of living for Gypsies. This project will enhance the quality of living, the sustainable and inexpensive design using of bamboo and mud as a building material with different techniques. creating modules which can be implemented in any part of the world with respect to the climate conditions.

11 Assessing the Comprehension of Ipcc Graphs among Policy-Makers

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Background/objective. The Intergovernmental Panel on Climate Change (IPCC) has arguably the most wide-spun process of communicating the current state of climate change knowledge. As climate change, its impacts on society, and ways to sustainable development is a trans-disciplinary effort, IPCC chapters should be scientifically precise, yet also understandable to the expert audience from a wide range of fields to ensure informed and sustainable decisions. Graphs typically appear well-suited to render complex information easier to understand, to say "more than a thousand words". Graphs are also prevalent in the IPCC reports, often depicting key points and major results. But the popularity of graphs in the IPCC reports contrasts a neglect of empirical tests of their understandability. Here we put the understandability of two graphs taken from the Health chapter of the Fifth Assessment Report (Smith et al., 2014) to an empirical test. Method. We evaluated objective understanding (multiple-choice questions) and subjective understanding (self-assessed confidence) in relevant target audiences of the IPCC report. Our sample consisted of staff-members from climate-related governmental organizations (GO, n=43), climate-related non-governmental organizations (NGO, n=43) and a comparative sample of junior diplomats (n=47). Findings. Results showed that (i) with an average objective understanding of 77% versus 37% correct, objective understanding varied widely between the two graphs; (ii) objective understanding did not vary between the three groups, but (iii) particularly GO tended to overestimate their understanding; and (iv) typical mistakes in understanding of the graphs were identified for those aspects that go against intuition (such as higher=more).Discussion/conclusion. This is the first systematic evaluation of understanding of IPCC graphs in policy-makers that lay the foundations for sustainable development. Results suggest that understandability of IPCC graphs could be improved by reducing their reliance on complex numerical concepts and by making use of intuitive interpretations of graphs.

12 Detoxing Efforts in Textile Supply Chain : Role of Standardization and Consumer Education

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Theme : Sustainable Production & Consumption (SDG 12)

a) Almost all persons on the planet are in contact with some sort of textile, fabric, or footwear. Each of these products uses chemicals during their production either to achieve a function like water-repellence, for adding texture, or more commonly for colour. In addition to the wide use of chemicals used, the large quantity of water, and the presence of hazardous chemicals in the waste water has resulted in apparel and footwear sector to be regarded as two of the most ecologically polluted industries in the world.
b) This growing awareness and concern of safety issues related to chemicals in textiles, has been driven by numerous factors; an increased knowledge of the hazards associated with chemicals used; legislation (such as REACh in the European Union and California Proposition 65 in the USA); DETOX campaign by NGO's like Greenpeace; and consumers' desire for products that are safer for human health and environment.
c) As a result the industry has further concentrated efforts with associations/groups focusing on specific aspects to achieve a Sustainable Textile Supply Chain.This paper elaborates on the challenges, and provides and overview of how the industry is responding to this incorporate sustainability.
d) Consumer : Consumers need to be informed about their role during usage (washing, responsible recycling, etc)
e) Government Collaboration : Align with SDG 17.14 and SDG 17.16 between global policymakers, UNECE

13 Dual Climatic Monitoring Approach for Preserving the Cultural Heritage Sites in Syria

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Heritage sites and buildings are faced with many challenges due to climate change. A rising sea level and increased surface temperature make problems worse. Conservation is essential to saving the cultural identity of generations, in which technology, science, and planning are the key components of activating preventive conservation aspects. This paper used mixed methods to propose a resilient, long-term approach to overcome the predicting climatic risks in the case study area. This included the two-way stepwise methodologies using top-down and bottom-up preserving and monitoring processing upward. The approach tries to protect heritage at a high level from facing further problems. Moreover, it is controlled by the lower levels and historic vocabularies' microclimates through the monitoring of heritage structures in the threatened areas. This includes documenting and identifying the existing situation of the heritage structures and climatic risks, and providing sets of data of microclimate features of the heritage structures to discover the appropriate micro key strategies to achieve climate control of historic buildings within the tight budget for further preservation. Therefore, the dual approach aims to find a whole image of perception in the middle level of interventions within the conservation levels to realize the final product, which is resilient heritage.

14 Ecology and Epidemiology of Wild and Domestic Suids with Special Reference to African Swine Fever (ASF) and Foot and Mouth Disease (FMD) in Ndumo Game Reserve (NGR), South Africa.

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Wild pigs can be central in the transmission of livestock diseases depending on the geographic setting and contact rate with domestic pigs. Though a number of studies have been conducted concerning the role of wild pigs in the epidemiology of various diseases, studies targeting population dynamics and farmer to consumer value chain remain patchy. This is particularly true in Southern Africa where very limited work has been done in the field of pathogen transmission between wild and domestic pigs, with the exception of ASF, but often without considering the populations dynamic or the role of the value chain in this transmission. There is therefore an urgent need to investigate wild-domestic animals' demographics, to assess the value chain and the potential existence of an interface between wild and domestic suids. The major objectives of the study are to:

1. Conduct a census of wild pigs (warthogs and bush pigs) in (NGR) and its wildlife-livestock interface
2. Understand the domestic pig value chain in Mathenjwa community
3. Quantify the interaction (spatial and temporal overlap) between wild and domestic pigs in Mathenjwa community
4. Determine whether warthog and bush pigs in northern KwaZulu-Natal play a role in the epidemiology of diseases such as ASF, FMD and AD.

To satisfy the stated objectives, data were be collected using transect counts, questionnaire survey, focused group discussion, collection of ticks, and collection of blood samples. Through understanding the extent which wild and domestic pigs interact in NGR, this will enable setting up early warning systems and ultimately controlling the spread of diseases such as FMD and ASF as the area has been declared ASF and FMD control area. This will also enable crafting more effective measures to curb transmission of the disease to domestic pigs and more directed intervention in the event of an outbreak

15 Effect of Libr Concentration on the Structure and Performance of Pvdf Membrane for Waste Water Treatment.

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The requirements for quality drinking and industrial water are increasing and water resources are depleting. Moreover large amount of wastewater is being generated and dumped into water bodies without treatment. These have made improvement in water treatment efficiency and its reuse, an important agenda. Membrane technology for wastewater treatment is an advanced process and has become increasingly popular in past few decades. There are many traditional methods for tertiary treatment such as chemical coagulation, adsorption, etc. However recent developments in membrane technology field have led to manufacturing of better quality membranes at reduced costs. This along with the high costs of conventional treatment processes, high separation efficiency and relative simplicity of the membrane treatment process has made it an economically viable option for municipal and industrial purposes. Ultra filtration polymeric membranes can be used for waste water treatment and drinking water applications. The proposed work focuses on preparation of one such UF membrane- Polyvinylidene fluoride (PVDF) doped with LiBr for waste water treatment. Majorly all polymeric membranes are hydrophobic in nature. This property leads to repulsion of water and hence solute particles occupy the pores, decreasing the lifetime of a membrane. Thus modification of membrane through addition of small amount of salt such as LiBr helped us attain certain characteristics of membrane, which can be then used for many applications such as waste water treatment. The membrane characteristics were investigated through measuring its various properties such as porosity, contact angle and wettability to find out the hydrophilic nature of the membrane and morphology (surface as well as structure). Pure water flux, salt rejection and permeability of membrane were determined by permeation experiments. A comparative study of membrane characteristics of simple and modified membranes with various concentration of LiBr helped us know its affectivity.

16 Embracing Sustainable Developmental Goals: An Experiential Pathway Towards Leadership Development Living in the Anthropocene

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Human development is at a precipice. In the suggested epoch of the Anthropocene leaders throughout the world are faced with dire challenges never faced before and are unable to offer solutions. Technology, globalization, and population growth are catalyst for a rapidly changing world of complexity that is out-distancing the mindset of leaders. There is a commonly held attitude that if we want to have an Earth, we must change the way humanity operates in the planet—the idea that we need to 'save the planet'. Humankind continues to fall short on sustainable developmental goals, pushing ever so close to passing dangerous non-returnable planetary boundaries needed for human sustainability. It can be suggested that humanity needs to move beyond self-deception, to understand that it is not a matter of acting to save our 4.55 billion-year old planet. It is more personal, and a matter of acting to save humanity. This paper shares a phenomenological focused study that shares insights and epiphanies of global leaders through a series of interviews that explore what is the lived experience of a Leader's Nature Retreat (LNR). Through the results this paper explores insights on leadership development that suggests by renewing and evolving a non-dualistic relationship with Nature and our planet there might be an opportunity to shift our thinking and actions towards embracing sustainable goals.

17 Environmental Benefits of Bike Sharing: A Big Data-Based Analysis

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Bike sharing is a new form of transport and is becoming increasingly popular in cities around the world. This study aims to quantitatively estimate the environmental benefits of bike sharing. Using big data techniques, we estimate the impacts of bike sharing on energy use and carbon dioxide (CO_2) and nitrogen oxide (NO_X) emissions in Shanghai from a spatiotemporal perspective. In 2016, bike sharing in Shanghai saved 8,358 tonnes of petrol and decreased CO_2 and NO_X emissions by 25,240 and 64 tonnes, respectively. From a spatial perspective, environmental benefits are much higher in more developed districts in Shanghai where population density is usually higher. From a temporal perspective, there are obvious morning and evening peaks of the environmental benefits of bike sharing, and evening peaks are higher than morning peaks. Bike sharing has great potential to reduce energy consumption and emissions based on its rapid development.

18 Factors Influencing Consumers' Willingness to Pay a Price Premium for Green-Labelled Housing: Evidence from a Nationwide Survey among Prospective Homebuyers in Israel

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Green buildings (GBs) are rapidly becoming a national priority in many countries worldwide. This trend is sustained by energy conservation needs and growing public concern for the environment. Many studies suggest GBs bring multiple benefits to homebuyers. However, the lack of knowledge or uncertainty about these benefits, combined with the proven presence of nominal price premium for GBs, may prevent or inhibit potential homebuyers from entering the GB market. Therefore, governmental incentives may be required to facilitate the housing market transition from conventional to green. The present study serves the dual purpose of examining the size of the price premium that potential homebuyers in Israel are willing to pay for GBs and investigating the potential impact of prevalent GB policy instruments on the premium's size. Findings from a nationwide online survey among a representative sample of potential homebuyers indicate an agreeable GB price premium in the range of 7-10%. Expected maintenance savings and better familiarity with GB benefits are found to be positively associated with the size of this premium. However, counterintuitively, economic incentives, such as tax breaks and subsidized loans and grants, are found to result in lesser, rather than greater, willingness to pay the GB price premium. These results indicate that financial incentives to homebuyers may be counterproductive, by generating emotive and opposite responses that may be opposite to the intended ones. The present study suggests a mix of financial and non-financial incentives to homebuyers as a stimulus for GB choice. It also emphasizes the importance of evaluating unexpected consequences of future incentives and interventions in the GB market.

19 Farmers' Perception of Climate Change: Association with Climate Trends and Factors Influencing Perception.

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Climate change is adding to the challenges of farming communities across developing countries. To tackle this new challenge, it is important to understand how farmers perceive climate change. Farmers' perception of climate change is important in determining their response to it. It is also important that farmers' perception is rooted in scientific knowledge about climate change and aligned with actual meteorological data. Therefore, this study was designed to inquire into farmers' perception of climate change and a comparison with actual climate trends. The study was conducted in three irrigated cropping zones of Punjab, Pakistan, with a total sample of 300 farmers. The results revealed that the farmers' perception varied across cropping zones and along with education of household head, farmers' household income, size of landholding, availability of electricity, tube well ownership, membership of an organization and market access. Mann-Kendall and Sen slope tests were employed to identify the meteorological trends in temperature and precipitation. The results revealed that the temperature increased in three cropping zones from 1980-2012, which also converged with the farmers' perception. The precipitation trends indicated no apparent annual and seasonal change, while for the mixed cropping zone the precipitation increased in September, while it decreased during March and April in the wheat-rice zone. No significant precipitation trend was found in the wheat-cotton zone. The study concluded that farmers' perception of temperature converged with the actual climate data, while for precipitation it was more divergent than converging. The shortening of the winter season was well perceived by the farmers as the temperature increase was more pronounced at the end of the winter and start of the summer season. The major crops in all three zones, namely wheat, cotton, rice and sugarcane will experience serious effects on their yield, as the temperature change has occurred in the critical harvesting and sowing times of these crops. The role of information sources and the extension department needs to be strengthened to bridge the gap in scientific knowledge about farmers' perceptions of the climate.

20 From "Confrontation" to "Collaboration": Representation of the Formal and Informal Strategies for Urban Village Renewal in Shenzhen, China

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Urban villages (*chengzhongcun*) are a unique urban phenomenon in China, in which thousands of former rural villages have been rapidly urbanized, along with the surrounding construction environment. However, the government, developers, and many urban planners suggest that these urban enclaves should be demolished during urban renewal, which can be ascribed to their "chaotic" building forms and "unhealthy" living conditions. Nonetheless, urban villages do not only provide affordable housing and employment opportunities for the massive low-income populations, they also support the operation of city ecosystems. In recent years, informal rehabilitation activities in Shenzhen have been effective at ameliorating the environmental quality of urban villages. Notably, these activities have prompted the government to change their attitude towards these urban villages from previous strong support of demolition to latter advocacy of rehabilitation through multiple approaches. Specifically, the "Zoning Renewal" Plan (*Fenqu Gengxin*) has been recently initiated in Shenzhen, which has ushered in a policy of achieving typology-based urban renewal by taking into account the sizes, locations, socio-cultural values, building forms, and existing environmental qualities in urban villages. Typically, the collaboration of village-led renovation activities (informal) with government-guided urban renewal programs (formal) is a vital link to form the "Zoning Renewal" Plan. This paper aimed to review the implemented policies and strategies of urban renewal in Shenzhen and discuss the formal and informal approaches adopted in four typical urban villages (including Baishizhou, Nantou, Shuiwei, and Hubei) so as to understand how the informal rehabilitation activities influenced the changes in government's attitudes and policy-making towards urban villages, and how the concept and method of "Zoning Renewal" can contribute to a sustainable, ecological, and resilience-inspired urban development. Noteworthily, the four urban villages adopted in this paper were featured by their distinct socio-cultural characteristics, which had been considered as four critical models of urban renewal in Shenzhen. During the last few years, the wholesale demolition of urban villages and frequent construction of large-scale high-rise buildings in Chinese cities had contributed to the dramatic intensification of the urban heat island and energy consumption. Moreover, numerous low-income people also had to be marginalized, which resulted in a loss of urban diversity and the subsequent degradation of urban adaptability. By reflecting the above-mentioned socio-ecological problems, the experience of Shenzhen can potentially provide insights for the other cities in China to seek more sustainable strategies for urban renewal.

21 Living as Earthlings: Towards a New Planetary Subjectivity

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Living in the Anthropocene confronts human beings with new responsibilities as biological entities, cultural beings and geological agents. Human impact on the Earth system has come to rival some of the great forces of nature. This unchallengeable heart of the Anthropocene narrative leads to a growing number of diagnoses, interpretations and suggestions about *what to do*? One thing to do is to re-imagine human identity. The primary identity marker of humans in the Anthropocene is being 'earthlings': inhabitants of the single living planet Earth.

In our paper we will defend that 'becoming earthlings' is not a simple fact. Rather it is the basis for the continuing development of a new subject identity and subject role in which human beings will reposition themselves in what is called 'The Great Transformation'.

Becoming an 'earthling' requires us to rethink how specific local challenges and responsibilities interact with global developments and what that means for humans in their own local circumstances, while simultaneously being world citizens. New 'front lines' between localized citizenship and the realities of globalization can be seen as the *locus* and primary anchor point of planetary responsibility.

Diverse cultural, religious and philosophical values and traditions, and what they teach us about community and cosmopolitanism, could offer inspiring and helpful sources in the process of developing this new planetary subjectivity.

22 Local Community Institutions for Sustainable Creative and Productive Enterprises in the Border Region of Indonesia - Timor Leste in Belu District

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Belu is one of the border districts in East Nusa Tenggara. Generally the border area of the Republic of Indonesia is still categorized as an underdeveloped area, the condition covers a very wide area with the potential of untapped natural resources . Institutions are major components of local economic development, especially the development of creative and productive economic activities in the border region. This study aims to map the role of institutions in such activities in Belu using interpretative structural modeling (ISM). The results indicate that district and state college are two institutions that will play a major role in the first phase of development, followed by the community cooperative, community enterprises and non-governmental organizations (NGOs). If this policy strategy well implemented, then the creative and productive business development for coastal communities in the Belu district is likely to succeed.

23 Low-Carbon Energy Scenarios 2050 in North-West European Countries: Towards a More Harmonized Approach to Achieve the Eu Targets, Taking into Account Societal Trends

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FocusThis study proposes an approach to comparing and assessing the policy settings in the low-carbon energy scenarios of the European countries. First, it presents a methodology for such an analysis, including ten characteristics. Second, based on the combination of qualitative and quantitative methods, it evaluates the low-carbon energy scenarios of six north-west European countries as examples. Further, these scenarios are evaluated by contrasting them with societal trends, which may support the transition towards a low carbon economy (e.g., "shared society") or may counteract it (e.g., a trend towards single households). Finally, conclusions and recommendations are made concerning the possible ways to achieve the scenario design improvement.**Methodology**This study uses qualitative (literature review, expert procedures) and quantitative methods (statistical analysis, trend monitoring) to analyse information from the following sources: scientific publications, international and national (governmental) reports and strategic programs, international statistics (European Commission, etc.), materials of the conferences and workshops, and expert consultations. Based on the literature review and consultations with the national experts (the Netherlands, Germany, France, Belgium, Denmark, and the UK), the conceptual framework of this research includes ten characteristics: modeling framework, ambitiousness of the 2050 targets, relations with other countries, stakeholder involvement, technology favoring, possible non-technological options, economic component, usage of scenarios in policy design, intermediate indicators of targets' achievement, and revision of scenarios.**Results and impacts**The analysis has shown that all selected countries have the potential to modify their energy scenarios in order to achieve the joint European 2050 targets. Therefore, since these countries are socially and economically interrelated, a more harmonized approach is needed to be designed and introduced on the European level, which should take into account societal trends and include the common requirements for scenario development. Ten characteristics proposed in this research may serve as an initial input to such harmonization.

24 Make Your IT Purchasing More Sustainable

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It's quite challenging for professional buyers of IT equipment to require sustainability features and to maintain the requirements throughout the purchasing process. It's not uncommon that the requirements are lost on the way for various reasons. Too few products to choose between or budget restraints might pressure the purchaser to omit requirements. Another problem can be that the requirements are not specified clearly enough which forces the buyer to settle for a lesser alternative. How can you make sure that ambitiously set requirements for sustainability features of IT-products are kept all the way to the delivery of the products? The presentation aims at giving practical guidance in how to answer this question.

Before writing the contract

Make sure that your organization's sustainability targets cover purchasing and specifically IT products.Include team members with sustainability expertise in the process to ensure that these aspects are considered throughout the process. Inform vendors early about your intentions to require the latest version of a specific criteria document in your contract terms to give IT brand companies time to certify the product models you need.

Contracting phase

Make your sustainability focus clear for vendors by including it in the contract name, eg: "Procurement of more sustainable notebooks" and make sure that you specify the correct name of the latest version criteria document. By choosing criteria with sufficient breadth and depth you can cover environmental criteria and social responsibility at the same time.

When the contract is signed

Make sure that management and co-workers are aware of the social and environmental risks connected to IT products and how sustainable procurement helps you reach sustainability goals. Stay true to your strategy. If products are replaced during the contract period, make sure the replacement products also fulfil your sustainability requirements.

25 Mapping the Technology Trajectory of Clean Coal in China Based on a Patent Analysis

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Coal is the most frequently used primary fossil fuel in China for electricity generation, iron making, and cement/concrete and chemical production. However, one critical issue in promoting coal utilization is controlling environmental pollution. Clean coal technologies are needed to utilize coal in an environmentally acceptable way and to improve coal utilization efficiency. This paper uses patent analyses to analyze the coal cleaning technology trajectories in China. It concentrates on the following three aspects: development history based on patent data mining (from a technological paradigm perspective), current status and development of key clean coal technologies, and patent citation network (knowledge flow and spillover). The results show that China's clean coal technology (CCT) began in the 1990s (mainly coal-based gas fuels, liquid fuels, and chemicals). China's CCT was in the process of being tested from 2001 to 2005 and in the industrial demonstration stage from 2006 to 2015; it has been in the stage of industrial development since 2015. This study also shows that CCT in Japan is at the highest level in the world; although the China CCT firms are still knowledge absorbers, the CCT patent count in China has been increasing year by year, especially since 2010. Finally, this paper shows China has built a large number of demonstrations using CCT by introducing technology and indigenous innovation in the four technologies areas: coal processing, coal efficient combustion, coal conversion, pollution emission control, and waste disposal. These projects have effectively promoted the development and application of CCT in China, and some CCT has been ahead of the international level. However, due to there being a lack of relevant policies and the combination of social benefits and long-term comprehensive economic benefits, CCT in China is generally characterized by large investments and long payback periods. Based on the above, this paper puts forward some policy suggestions for CCT in China, especially regarding local government-level policies.

26 Measuring and Explaining Airport Efficiency and Sustainability: Evidence from Italy

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Aviation can be considered essential within the on-going process of (cultural, social and economic) globalization, also from a sustainability point of view. Actually, any increase in economic activity, industrial production or trade relations unavoidably causes greater need for transport and an increasing level of externalities, such as air pollution.
Through studying the connection between the catchment area of Italian regional airports and their management quality, in this paper we try to ascertain when regional airports are economically unsustainable due to problems related to their catchment area dimension and when this happens because of management deficiencies. In order to obtain this result, we use the DEA method that appears particularly adequate because it allows to get scores measuring overall technical, pure technical, and scale efficiency.
In the recent years, privatization and restructuring processes have affected also the Italian airport industry, with likely spillovers on their overall efficiency. We demonstrate that the airport efficiency depends not only on its exogenous features, on which the airport management has a limited direct control, but also on factors that can be directly handled by local managers.
We will show how production performances are affected by external or environmental factors on which the airport management cannot act so that an airport could be inefficient for "structural" reasons. In other cases the fault of airport efficiencies can be attributed to management problems. Such study can be generalised to many regional areas or airport and it can help to improve policy making related to airport sustainability.

27 On the Legitimacy of Circular Economic Policies in the Netherlands

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A circular economy provides for people's needs without placing an unacceptable burden on the environment and without exhausting natural resources. The Dutch government program 'A circular economy in the Netherlands by 2050' aims at achieving such an economy. We argue that in order to achieve such an economy it is important that citizens consider policies promoting the circular economy to be legitimate. In this paper, we argue that the legitimacy of policy consists of both input legitimacy and output legitimacy. Whereas input legitimacy concerns support for the more general goals of the policies (e.g. striving for a more circular economy), output legitimacy involves the support of concrete interventions to achieve these goals (e.g. households have to pay for each kilo produced waste or the mandatory use of recycled packing materials by industry). We present the results of a survey among a representative sample of Dutch citizens (n= 1,278) and representatives of Dutch firms (n=833). In this survey we questioned the citizens and representatives of firms About several underlying aspects of the input and output legitimacy. Our results show that a large majority of the citizens and representatives of firms support the general goal of striving for a circular economy (input legitimacy). Concrete interventions are also supported by both groups of respondents. However, policies aimed at citizens are more supported by the representatives of firms and vice versa, i.e. policies aimed at firms are more supported by citizens.

28 On the Play between Pro-Environmental Behavior and Subjective Well-Being: The Combined Role of Intrinsic Values and Intrinsic Satisfaction

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Abstract In the face of the pressing need for better resource management that we are presently going through, the discourse on this topic has taken several interesting directions. One of these has been the importance of individual behavior on resource consumption and its relation to happiness. Thus, the exploration of the determining factors behind the relationship between pro-environmental behavior (PEB) and subjective well-being (SWB) has been key to the ability to reproduce and work with this relationship. This pursuit has led us to investigate the effect of intrinsic values and intrinsic satisfaction as mediating factors between the PEB-SWB relationship. In particular, we set out to investigate the shared role of the components of intrinsic values and intrinsic satisfaction, since the two dimensions, one for each set of values, are very similar, being community feeling and participation. To prove this, we employed a structural equation model and targeted Tokyo, the capital city of Japan as a study case. Our findings show that the Community Feeling dimension (a component of intrinsic values) correlates with Participation (a component of intrinsic satisfaction) (Cov 0.57, significant at 5% level), and that PEB had a positive relationship with SWB (PEB to SWB: 0.17, significant at 1% level). This means that an entry point to the pathway to happiness could be found when engaging in waste prevention behaviors that are both rooted in intrinsic values and bring intrinsic satisfaction. Thus, our results unambiguously provide some avenues for the design of promotion tools and demonstrate how having an inclination to help and participate in the community could change our own well-being by simultaneously having a positive effect on our society.

29 Overlapping Peatland Policy and Oil Palms in Riau, Indonesia: An Ambiguous Sustainable Development Strategy

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The ban on the use of biodiesel from palm oil by the European Union (EU) is troubling oil palm growers in Riau. As the largest landowner in Indonesia, Riau oil growers are assessing whether this policy is a 'trade war' scenario, with the EU utilizing the issue of the Sustainable Development Goals (SDGs). Responding to the EU, the attitude of the central government, which has issued overlapping policies, is detrimental to farmers. The purpose of this paper, firstly, is to explain the response of oil palm farmers in Riau to the policy of banning palm oil by the European Union. Secondly, it explains why the central government has issued overlapping policies. Thirdly, it finds the link between EU policy and government policy. This research uses a qualitative approach with a descriptive analysis method. Data were collected based on documents supported by interviews and analyzed qualitatively. The paper concludes that, firstly, oil palm growers in Riau are assessing whether the oil palm policy of the EU is a 'trade war', protecting similar products that are 'less competitive' in the European market. Second, the policy issued by the central government to save peatlands from fires is considered by the farmers to overlap. Third, in the perspective of farmers, the attitude of the EU and the response of the central government has a significant relationship. Relationships have been built on the basis of mutual assumptions that protect each other's interests, while forgetting the interests of the farmers. The findings of this paper show that the Sustainable Development Goals (SDGs) program that was originally designed to preserve the natural environment was ambiguous. Each party takes advantage of the issue of the SDGs to protect its interests and cover its weaknesses.

30 Poach, Chuck, Freeze, and Launder: South Africa's Legal Implications Response to Environmental Transnational Abalone Poaching Syndicates

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Organised crime has no uniform international definition. Although both the UNDP , the National Crime Prevention Strategy, and the White Paper on Safety and Security pointed to the problem of transnational crime, particularly the threat posed by the presence of international and regional criminal syndicates, the actual method of combating organised crime was poorly conceived and hamstrung by poor coordination among law enforcement agencies and inadequate funding from the central government. Organised criminal groupings exploited these drawbacks to entrench themselves even further, increasing their geographic reach and the range of their criminal stock in trade.

This article looks to the shift from regarding illegal Abalone poaching as a sustainable wildlife management problem towards viewing it as an environmental economic crime perpetrated by organised criminal syndicates in South Africa and the Far East. It deals with the challenges confronting the South African criminal justice system in its efforts to combat abalone poaching. The problem appears to be a lack of co-operation among the criminal justice authorities and other governmental agencies responsible for fisheries and environmental conservation and sustenance.

Although abalone poaching goes on under treaty-based conventions regulating economic crimes, all of which South Africa has ratified and incorporated into national law, it is an issue that barely attracts the attention of criminal law writers. The literature teaches universally that abalone poaching, like the illegal harvesting of all wildlife, ravages the economy and the country's natural resources; it also creates horrendous social problems in the affected communities.

It is of scholarly importance that research in the maritime sector is effectively utilised as a basis for policy making, thereby narrowing the gap between research and policy making on a wide range of maritime challenges facing Africa as a continent, which is emerging as a global economic actor in the 21st Century.

31 Policy Interventions, Uneven Development, and Rescaling in the Beijing-Tianjin-Hebei（Jing-Jin-Ji） Region, China, 1962–2017

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With the emergence of social problems such as the "Beijing Folding", China's regional uneven development in metropolitan areas has recently become a rising concern. As a typical case, it remains key question to understand the development process in Beijing and its surrounding areas. This paper aims to show the evolution of policy intervention and spatial development in the Beijing-Tianjin-Hebei region, also known as Jing-Jin-Ji region, from a historical perspective, to reveal the internal dynamics and mechanism of regional uneven development in a highly centralized environment, and to explain the role of policy intervention in reterritorialization. Firstly, through the analysis of the statistics of the State Administration for Industry and Commerce, this paper examines the capital flow and the changes in the distribution of enterprises of different sectors in different regions from the 1960s, and measures the capital connections and the evolution of uneven development in the Beijing-Tianjin-Hebei region. The research shows that in the past half century, it has generally become more polarizing in the Beijing-Tianjin-Hebei region. At the same time, the coupling relationship exists between reterritorialization and rescaling, and changes in regional development pattern are positively associated with changes in central-state relations. This paper further discusses the internal dynamics and mechanism of uneven development in metropolitan areas, by analyzing the evolvement process of the production relations under the policy intervention, through the typical game model. Finally, the author discusses on the applicability of growth pole theory and proposes the policy-oriented strategy as a planning solution.

32 Population Explosion and City Sustainable Development, Indonesia Case

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Community development should be realized by applying the concept of environmental and sustainable development. The limited amount of natural resources is unbalanced by the increasing population and lifestyle. Proper management of natural resources to improve the quality of community life from one generation to the next is a major problem in environmental development. This study focuses on the metropolitan city Jakarta as the capital city of Indonesia, which is a very attractive city area for immigrants from all over the regions around it. The data source used is from the survey and census of series conducted by BPS Statistics Indonesia. The applied analytical method is descriptive analysis to draw conclusions and propose policy advice.
The significant, increasing population of Jakarta is without support and is offset by the number of jobs, public facilities, housing, and so on, which certainly raises a problem that must be solved with the right solution. In making an area more urban, one should pay attention to the spatial area according to the carrying capacity, environmental capacity, harmony, and balance with the function of environmental order to improve the quality of the environment and finally change the quality of life of the inhabitants of humans.
In Jakarta , development requires cooperation between the government and the community in order to realize sustainable development. Thus, it is necessary to increase participation among community members to effectively increase the use of resources, so that present-future communities can enjoy the development results. Various community and government activities have realized sustainable urban development, and indicators have been achieved. With this, public and government efforts to reduce the negative impacts on the environment, health, and comfort of the urban community can be publicized, so as to improve likelihood of realizing a sustainable city.

33 Preference and Willingness-To-Pay for Meat Substitutes Based on Algae

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Meat consumption and the resulting production patterns are far from sustainable. Hence, more consumers are willing to opt for meat substitutes to counteract the negative environmental impact of meat production. However, in many Western countries, the market share of meat substitutes still have to increase significantly if they are to support the United Nations sustainable development goal of responsible consumption and production. Consequently, more research is needed to take examineconsumer preferences for meat substitutes. In our case, we focus on meat substitutes based on algae. Algae have a favorable, high quality, nutritional protein value. In contrast to meat substitutes based on pulses, algae are unicellular organisms with beneficial omega-3 fatty acids. Increasing the market share of meat substitutes based on algae would therefore not only have a positive impact on sustainable food production, but also have the potential to improve consumer health. Consequently, research is deemed necessary to identify the relevant drivers of food choices that can increase market share of meat substitutes based on algae. Our research aims to fill this gap. First, we conducted a choice-based conjoint analysis in three Western European countries (Germany, France, and the Netherlands). Here we aimed to reveal cross-country consumer preferences for meat substitutes based on algae. Second, we employed a questionnaire using different multi-item scales to measure consumer's food choice motives, their attitude toward meat substitutes based on algae and their food-related lifestyle. Lastly, we combined these results to obtain nuanced insights into the drivers of consumer preference for meat substitutes based on algae. Our results show that consumer preference for meat substitutes based on algae differ across countries as well as across psychometric consumer characteristics. Our findings provide important insights for food marketers and policy makers when it comes to increasing the market share of meat substitutes based on algae.

34 Prioritising Landfill Waste Management to Enhance Water and Food Security: A Case Study of the Northern Landfill Site in Bloemfontein South Africa

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Solid waste management in developing cities is a major threat to water and food security. The final disposal option for solid wastes is usually landfill sites. These sites cannot be segregated from the surrounding environment, with soil, water and air quality mostly compromised due to pollutants emanating from the waste. Possible contaminants and their impact on ground and surface water quality, and the productive potential of the agricultural land surrounding the northern solid waste landfill in the city of Bloemfontein, South Africa, was investigated. The city has a semi-arid climate and experiences frequent droughts, erratic rainfall distribution and cold fronts in winter and heat waves in summer that undermine water availability, with groundwater being the most suitable alternative source of water. The landfill was characterised using GIS, which integrated spatial data including geology, topography, rivers, roads and land use within a 5 km radius. Soil and leachate samples were taken up to a depth of 2 m, and groundwater samples from a monitoring borehole were analysed for physical and chemical parameters. Hydrochemical speciation models were developed using these parameters for the interpretation and quantification of geochemical risks due to contaminant mobility. The result was used to produce a risk profile map to determine the level of risk that the landfill could pose to neighbouring land use. The outcome of this study shows the significance of landfill management within the context of limited resources intensified by factors such as effects of climate change, increasing population, urbanisation and affluent lifestyles.

35 Quantitative Assessment of National Food Systems Sustainability Status

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Food systems are at the heart of at least 12 of the 17 Sustainable Development Goals (SDGs). However, most previous studies analyzing the sustainability of food systems have focused either on a particular dimension (e.g. food security, environment, or economic) or country. Moreover, within a particular dimension, the focus has been on a limited number of indicators (e.g., calories, protein for food security, or GHG emissions for environment). Designing interventions to improve only a particular indicator can lead to trade-offs with other indicators, and therefore an integrated approach is necessary. Here, we present the first global scale analysis quantifying the status of the national food system performance of 156 countries for the year 2011, employing 25 sustainability indicators across seven domains: nutrition, environment, food affordability & availability, sociocultural wellbeing, resilience, food safety, and waste. Each indicator is normalized to the 0–100 range to enable comparison. We assess the nutritional quality of the average national daily diet, taking into account the intake amount of >25 essential nutrients and several nutrients of health concern (e.g. fat, cholesterol, and sugar) in the consumed food items. Next, we compile the per capita environmental footprint of national daily average diets through four indicators (GHG, water, land, and biodiversity) using the global literature review and life cycle assessment (LCA) approaches. Finally, we test several food transformation scenarios for each country (e.g. converting to vegetarian or vegan diets) and the consequent change in sustainability indicator scores. The results show that each country has unique priorities for improvement on certain aspects of sustainability. High-income nations score well on most indicators but need to improve on environmental, food waste, and health-sensitive nutrient intake indicators. Low-income nations have low environmental footprints in general but need to invest in improving their essential nutrient intake. Transitioning from animal foods towards plant-based foods would improve indicator scores for most countries but could lead to deficiency of certain micronutrients that are currently supplied by animal foods (e.g. Vitamin B12 and Selenium). Our nation-specific, integrated quantitative assessment of global food systems can help policy-makers to set improvement targets in specific areas and adopt new practices while keeping track of the other aspects of sustainability.

36 Rediscovering the Culture of Sustainability: Vernacular Architecture as a Didactic Model for Sustainable Development

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Imbued with messages from the past, vernacular architecture presents a body of knowledge and design dexterity, created by the experience of our predecessors, of their association with the environment and, at the same time, demonstrating the richness of the world's cultural diversity. As such, in recent years, vernacular architecture has been ubiquitously invoked and positioned as an exemplary model for sustainable development. Emphasizing its ecological friendliness, a growing assemblage of researchers have argued that vernacular architecture is laden with sustainable character, and that it is a didactic alternative to the contemporary architecture, which is associated with uncontrollable greenhouse gas emission, disproportionate energy consumption, and unsustainable use of the earth's resources. However, in spite of the plethora of positions, it has all operated under preconceived themes and topics, which privileges environmental sustainability over the other pillars of broad sustainability conception. Against this background, this study argues that the rampant relativism in the recent discourse of vernacular architecture displaces the complexities and nuanced values presented by vernacular architecture to a narrow essentialist one and also relegates the broad understanding of sustainable development to a partial one. Thus, underpinned by the implicit assumption that values of vernacular architecture transcend the environment-centric representation, this article aims at discussing the holistic dimensions of vernacular architecture as a didactic model for the broad sustainable development conception. To this end, the paper established that vernacular architecture is forged in between economic, social, cultural, and environmental purchases and thus, this study contributes to the existing dearth positions with the discourse of the economic, social, and cultural perspective of vernacular architecture.

37 Regaining the Coastal Agency of Maracaibo

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Is a research project that studies the impact of environmental/sociocultural issues in the use of public space. Maracaibo is a waterfront city that has neglected the lake it faces. Throughout the years, this natural territory has been exploited for its oil, and nowadays the pollution and degradation are visible. This coast that has been abused and forgotten comprises 40km of the city, where less than 3km are public spaces. The city has taken little concern in integrating the coast to its planning, resulting in having a fragmented coast. This coast, a vulnerable natural environment, has been appropriated by local communities, without any help from local government institutions.
This research aims to gather data to look for ways to reconnect the citizens to its waterfront. This project aims to build on already established communities, and their way of living, enhancing their positive values through design and complementing their lacks through up-cycling strategies. The community Lago y Sol (lake and sun) appropriated the lot 30 years ago, and they lack many services. Currently, the public space they have to gather and recreate is a lot along the coast, which they have self-organized, but nowadays pollution in the waterfront makes it difficult to really enjoy this space. This project aims to find strategies for this community to manage the pollution of the coast in a playful manner, where cleaning will become a collective activity, and if possible using the collected objects as materials for the building structure.

38 Resolving Military Conflicts for Environmental Sustainability: A Way Forward for Sustainable Development

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Conflicts may emerge when two or more than two independent decision makers (DMs) seek to achieve their objective(s), making their own choices among the alternative options and having their own preferences with regard to their strategies, given the course of action taken by their opponent(s). The perpetual existence of conflicts has consequences. This may, in turn, have serious implications on the achievement of the objectives that the DMs seek. Similarly, military conflicts have serious negative impacts. The longer prevalence of strategic or military conflicts in specific regions and in relation to natural resources may have adverse impacts. The present study is a conflict analysis of the long-lasting Siachen glacier dispute between India and Pakistan. This conflict has two major consequences: financial/economic and environmental. The conflict has caused financial resources to drain from the economy. If the conflict would be resolved properly, these financial resources could be used more productively for the achievement of the sustainable development goals. Secondly, the long-term military presence has damaged the fragile ecosystem of "the roof of the world". This glacier stores a huge amount of freshwater and is an indispensable feature of the hydrologic balance of the countries in South Asia, especially India and Pakistan. The militarization of the glacier, coupled with global warming, has increased the glacial melt. Further negligence on this issue will have repercussions not only for the Siachen glacier, but it will also have serious spillover corollary effects on the overall ecosystem of the water towers of Asia – the Hindu Kush Himalayan region. This makes it reasonable to consider and treat strategic and/or military conflicts as environmental conflicts. In this study, the authors used an attitude-based conflict analysis in the framework of a graph model to trace out the solution(s) and examine how changes in the attitude(s) of DM(s) can affect the outcome of the conflict.

39 River Aliakmon Station-Central Greece: A Reference Field Laboratory for River Stage, Discharge and Chemical Quality Monitoring

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Water resources monitoring is becoming indispensable to water safety, early warning and efficient management. Even though conventional manned monitoring methods prove to be highly efficient and cost effective, stand-alone telemetric units tend to gain more ground in the last few years for numerous reasons (e.g. capture flash floods, pollution events etc).
As a prelude to progressive compilation of the Hellenic telemetric monitoring network of water resources, a reference monitoring station has been designed, instrumented and operate since December 2017. The station is equipped with state-of-the-art instruments delivered by market leaders in river flow monitoring, in-situ chemical water quality and monitoring data management, processing and archiving. On-line data transfer, is facilitated through GPRS and a dedicated cloud server. Installed instruments include a vented pressure transducer, a radar, an acoustic doppler current profiler (ADCP), a spectro::lyser™ UV-VIS spectrophotometer probe and an EXO2 multi-parameter probe. These instruments provide measurements of river stage and discharge, employing all well-established methods available around the globe. A portable ADCP along with propeller and electromagnetic river velocity instruments are also employed in the measurements. Moreover, measurements of pH, EC, T, BTX, TOC, TSS and DO are provided by the installed equipment.
Despite its short life time, Aliakmon station has already demonstrated its importance providing essential information on the hydrological and hydrochemical patterns of the river, also capturing a major pollution incident. Comparative study of the alternative methods available for monitoring river stage and velocity enable selection of the most suitable method depending on budget constraints and river characteristics. Having installed and calibrated state of the art instrumentation that provides measurements through virtually every available methodology, renders Aliakmon station a real field lab. It is envisaged that this facility will be expanded to a test site for alternative methods, measuring instruments constructed by different scientific instruments Houses and a hospitable site for scientists to perform research on high frequency data related to river hydrology and chemical quality.

40 River Pinios Hydrologic Observatory-Central Greece: A Valuable Research Infrastructure of High Added Value to Local Society

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Agia basin, a 44.5km^2 marginal sub-basin to River Pinios Basin in central Greece, has been selected as a field laboratory, where the "Pinios Hydrologic Observatory" (PHO) was established in year 2015. Main purpose of PHO is the identification and quantification of the major controlling hydrodynamic evolution processes and their transfer at the RPB scale to enable better simulation of hydrodynamics at regional scale. PHO is one of the 8 sites of the Greek Long Term Ecological Research network (LTER), and member of the International LTER (ILTER).
PHO comprises 3 fully equipped telemetric climate stations fully covering the altitudinal zones in the basin. A set of 11 autographic groundwater level and temperature instruments, water meters and discharge loggers have been installed, some additionally equipped with an electric conductivity sensor. Groundwater quality monitoring is performed covering a wide spectrum of parameters. Water balance calculations are enhanced through the installation of 2 soil moisture monitoring clusters within the observatory domain, that provide data on soil water content at 3 different depths and 3 different points per cluster. A cosmic-neutron ray probe is installed and operates to provide averaged soil water content fluctuation at a larger area compared to the soil nets.
Data measured in PHO are already intensively explored by the local society and the regional stakeholders for a number of purposes including efficient water resources management, irrigation programming, plant protection management, forest fire warning system, etc. A valuable insight of the system's hydrologic and hydrogeologic evolution is being acquired and understanding of the regional hydrology is growing. Calculation of key hydraulic parameters of the aquifer system is enabled as a prelude to deepen understanding of the hydrodynamics and the potential of the system, thus providing a valuable service to the regional water authorities. Last but not least, PHO shall act as a live field school for environmental education at all levels, thus contributing to the information and sensitization of the general public and the specialization of higher education students and scientists on state-of-the-art instrumented monitoring and analysis.

41 Soil Nitrate Nitrogen and Nitrogen Use Efficiency in the Pigeon Pea-Groundnut Intercrop Maize Rotation Cropping System in Malawi

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Soil nitrate nitrogen (NO_3^-–N) and nitrogen use efficiency (NUE) are important parameters of cropping systems involving legumes like the emerging pigeon pea-groundnut intercrop maize rotation cropping system. Legume biomass incorporation into the soil has the potential to boost levels of soil NO_3^-–N and improve NUE by crops. In Malawi, NUE is on the decrease as a result of declining levels of soil organic matter (SOM) and associated deficiencies of other macro- and micro-nutrients, particulary N, reduced soil buffering and ion retention capacity, and soil moisture. On this basis, an on-station experiment was conducted in two seasons (2011/2012 and 2012/2013 cropping seasons) at Chitedze Agricultural Research Station (13° 59′ 23.2″ S, 033° 38′ 36.8″ E) to assess the effect of legume biomass incorporation on soil NO_3^-–N and NUE caused by maize in the cropping system. Eight treatments replicated three times in a randomized complete block design were established. Three pigeon pea varieties—long (ICEAP 04000) and medium duration (ICEAP 00557) and groundnut (CG 7)—were grown as monocultures and intercrops in the 2011/2012 cropping season. The intercrops involved the planting of pigeon pea varieties with groundnut. At harvest, legume biomass was incorporated into the soil, and each plot was split into four subplots to accommodate four different levels of N (0, 50, 100, and 150 kg N ha^{-1}) applied as urea, $CO(NH_2)_2$ as top dress to the succeeding maize crop in the 2012/2013 cropping season. During planting, the maize crop was basal dressed with 50 kg P ha^{-1}. NO_3^-–N data was collected from emergence over a period of three weeks. This was done before top dressing with urea. Top dress with N was conducted three weeks from emergence. Nutrient uptake, partitioning, yields, and NUE data were assessed for the maize. All data were analyzed using a Genstat statistical package and were subjected to analysis of variance at a 95% level of confidence. Means were separated by the least significant difference (P0.05). The results of the study seem to suggest that there was high NO_3^-–N in the soil solution in all the treatment plots over the study period (106.4 mg l^{-1} to 463.1 mg l^{-1}). It was observed, however, that the level of soil NO_3^-–N in most cases was statistically the same ($p>0.05$) across the treatment plots. In general, mean soil NO_3^-–N was higher in the sub than top soil. This was attributable to the soil texture, which is predominantly sandy clay loam with a low to medium level of SOM, both in the top (0.9-1.6%) and sub soil (1.1-1.6%). Leaching of NO_3^- is high under such soil conditions. NUE was determined using the recovery efficiency (RE), agronomic efficiency (AE), and partial factor productivity (PFP) indices. Under the conditions of the study, RE ranged from 20% to 88%, AE ranged from 7 to 32 kg yield increase per kg of nitrogen applied, and PFP ranged from 27 to 104 kg grain yield per kg N applied. The linear increase in maize grain yield with the application of N and the presence of a diminishing-return relationship between maize grain yields (grain yield was near the yield potential at high N input), and increasing nitrogen supply, suggest that the RE, AE, and PFP values obtained from this study might apply both to low and high levels of N use, but up to an extent, beyond which additional N supply may not increase maize yields. Generally, for optimal NUE under low input agriculture, top dress with 50 kg N ha^{-1} could be ideal, while for high input agriculture top dress with 100 kg, N ha^{-1} seems to be reasonable. The recommendation may apply in similar agroecologies commonly found in the country and across Africa...

42 Stakeholder Impacts on Sustainable Development in Nigeria's Construction Industry.

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The shift towards sustainability and sustainable development has drawn Major attention in every country due to the challenges facing the Earth's capacity to sustain terrestrial life. Sustainability is meant to cater for the needs of the present without compromising the ability of future generations to meet their own needs. Striving to be sustainable may be easier or less complicated for some developed countries, but it is the opposite for developing countries like Nigeria. The Nigerian construction industry is a clear example of the need for sustainable concepts that will make the built environment sustainable. Nigeria has a population of about 180 million, which is increasing annually, making it the seventhmost populated nation in the world and first in Africa. Such population growth comes with challenges, such as: housing shortages; domestic waste disposal; the need for more power supply; clean and drinking water for domestic purposes; and other infrastructural developments. The attitudes, perceptions and the efforts of various stakeholders within the industry have an impact on these challenges. These include government agencies, clients, contractors, consultants, end-users and communities. As such, the aim of this paper is to identify and discuss the stakeholders' impact on sustainable development in Nigeria's construction industry with the view to offer more insight into such impacts. Several materials, such as official publications, journals, newspapers, and the internet, etc., were reviewed within the sustainable development field with emphasis on the case of Nigeria. The impact of the stakeholders in this regard was identified; this formed the backbone of the questionnaire. A pilot survey was used to test its suitability, after which it was randomly administered to various project professionals in the construction industry to ascertain the impact of various stakeholders on sustainable development within the construction industry. Cronbach's Alpha reliability test, mean item score computations, relative importance indices, and T-test statistics were used to analyzed the data obtained. The results outline the various areas and the rate at which the stakeholders impact sustainable development in Nigeria's construction Industry. However, These impacts were affected by their various perceptions, a set of success criteria and interest in the development projects.

43 Stimulating Local Economic Development (Led) through Co-Operative Governance in Small Towns in the Western Cape Province

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This paper aims to provide an overview of the ongoing research on "Cooperative governance and LED in selected small towns in the Western Cape province, South Africa.
"LED is widely regarded as the process by which public, business, and non-governmental sectors work together to promote and develop the economic potential of a locality with the objective of building up the economic capacity of the local area to improve its economic future and the wellbeing of its citizenry. Fundamentally, LED has been described as a stakeholder-driven initiative built upon common purpose and shared values. Thus, its success largely hinges on the meaningful participation of its diverse multi-actors in a collaborative process. As a litmus test for effective collaborative initiatives, diverse public participation implies a wide span of voices representing diverse values, concerns, governance issues, and factual knowledge of the socio-economic issues within the locality that need to be addressed. Therefore, the promotion of such inclusive representation and the participation of all relevant stakeholders provides a viable and complementary alternative to the traditional bureaucratic governance mechanism.

Section 152 of the Constitution (South Africa 1996) sets out the objects of Local Government to encourage the involvement of communities and community organisations in the developmental issues of their locality. Despite the practical attention paid to collaboration within government, it can be argued that there has been little academic research or systematic study into the successes and limitations of approaches to collaboration for the governance of LED in small towns.
It is, however, opined that stronger emphasis on understanding the key factors to drive the vision and strategic partnerships between the diverse LED stakeholders has become so imperative. To this end, the study aims to take advantage of the knowledge gap/opportunity to present a discussion of the various specific factors that can improve the efficacy of collaboration for LED in local municipalities.

Therefore, the paper seeks to address the following analytical questions:

- What characterised the dynamic design and implementation of plans, policies, and procedures for cooperation that resulted in the success or failure of municipalities to foster LED in the municipalities?
- This study, which is being conducted for a PhD at the University of Stellenbosch, is situated within the interpretivist paradigm in which qualitative methods are being utilized to address the research questions. It combines a literature review and documentary analysis, key informant interviews, and focus group discussions with municipal authorities and other key LED stakeholders in six municipalities (Swellendam, Theewaterskloof, Hessequa, Mossel Bay, Oudtshoorn, and Kannaland) in the Western Cape. The study seeks to assess the design and implementation of cooperative governance for LED in the six municipalities and, amongst other things, determine what the success factors are and what factors are pulling down municipalities in collaborating with other key stakeholders to promote LED, though they are exposed and managed by the same district teams. In addition, the study will evolve normative performance indicators to be used for the design, implementation, and assessment of performance in the collaborative governance for LED

The supervisors of this research are Prof Christo de Coning and Dr. Babette Rabie

44 Stimulative Effect of Village Democracy on the Investment Incentives of the Collective Forest Tenure Reform in China

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Based on the background of the democratic implementation of China's Collective Forest Tenure Reform (Tenure Reform), our study investigated the stimulative effect of village democracy on the investment incentives of the Tenure Reform by employing Cragg two-part models using the microdata of 652 households from the southern collective forest region, China. By proposing and verifying the hypothesis of a relationship between improved property rights, village democracy and household forestry investments under the reform, the results reveal that the forestland use right and disposition right had a significant investment incentive effect on households, while the beneficiary did not. More importantly, we found that village democracy could significantly moderate the investment incentive effect of the improved property rights. Moreover, the results indicated that this moderating effect mainly worked through village democracy improving the households' perception, cognition, and, thus, confidence towards their use right and disposition right of the forests. Therefore, the findings suggest that to further develop the investment incentives of the Tenure Reform, the household beneficiary right bundle and related policies still need to be strengthened. Also, our findings could be used to inform the government that effectively employing democratic procedures during the implementation of public policies can significantly improve the performance of these policies.

45 Sustainability with Inclusiveness: How Communities Could Employ the Social Capital of Tourism Cooperative Networks for Competitive Advantage

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Historically, the term "inclusive" was exclusively used with all-inclusive tourism. All-inclusive tourism is probably the antithesis of inclusive development. Likewise, traditional definitions of sustainable tourism too did not stress inclusiveness enough. The focus of sustainable tourism has been to ensure the sustenance of nature and culture, and inclusiveness was just one of the conditions that would support this. This paper is an attempt to blueprint the idea of inclusive sustainable tourism, which brings inclusion to the core of sustainable development. Inclusion in the cooperative governance framework activates social capital, and thereby tourism businesses can gain lasting competitive advantages.

46 Sustainability-Related Attitudes and Behavior among Faculty at a Southern U.S. University: A Case Study

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This working paper studies sustainability at a public southern U.S. university by examining the faculty's sustainability-related attitudes and behavior in their teaching, research, service, and community engagement. The proposed framework links faculty attitudes vis-à-vis sustainability with their professional sustainability efforts. With the intent of understanding how educators incorporate sustainability in their work both inside and outside the classroom, this study will survey part-time and full-time faculty using an online survey instrument. A random draw for monetary prizes will serve to incentivize survey participants. The data will be analyzed using statistical methods and the results will help to move the university's sustainability agenda forward. In a broader attempt to understand and affect sustainability efforts at the host university, this research will have several anticipated implications. From a practical perspective, it will provide a gauge of the faculty's professional sustainability activities and serve as the first step in advancing the university towards a more unified commitment to sustainability. By demonstrating how a university can meet the requirements for participation in external accrediting (e.g., AASHE (The Association for the Advancement of Sustainability in Higher Education)) and reporting (e.g., STARS™ (Sustainability Tracking, Assessment and Rating System)) agencies, this work will also help other universities moving towards more sustainable practices. Other practical implications of this research will include ways to transform the curriculum and the broader university and community environment, and deal with local- and state-level challenges to the faculty's and the university's sustainability efforts.

47 Sustainable Approaches to Link Small Scale Fisheries to Green Consumption

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Founded in 1997, The Marine Stewardship Council (MSC) is the world's leading organization in certification and eco-labelling of sustainable seafood. The MSC has developed a scientifically robust standard, against which fisheries can be assessed in order to demonstrate that they operate sustainably with a low ecological impact. Certification can help fisheries meet the growing market demand for sustainable seafood, while the presence of ecolabels on certified products allows seafood consumers to make informed sustainability choices.

Since 2010, the volume of MSC-certified seafood has almost doubled, to 18.5% of global wild-caught seafood in 2017; the goal for 2030 will reach 30% of global seafood landings under certification. Stakeholder engagement lies at the heart of the MSC's third-party assessment process, with sound management most often delivered through collaboration.

MSC data (taken from the Global Impacts Report 2017) show that over the course of their certification, 94% of certified fisheries are required to make at least one improvement to strengthen or further monitor the sustainability of their operations in order to maintain their certificate. By the end of 2017, 363 fisheries had made 1238 improvements, including the reduction of bycatch and the development of best-practice management plans.

Small-scale and Global South Fisheries are vital to food security, livelihood, and economic development, so it is critical that they are managed sustainably. The MSC has had some success working with small-scale fisheries, e.g., the Vietnamese Ben Tre clam fishery. The MSC is currently collaborating with regional governments, research centers, and conservation organizations aimed at supporting sustainable fishery programs, which include the "Good For Fish" Indonesian program, the "Sustainable Crayfish" Chinese program, and the West Central Pacific Tuna Fishery improvement program.

Having been on the market for 20 years, the MSC ecolabel program has received great market penetration in many regions and countries, with more than 28000 labelled, MSC-certified seafood products sold on the global market. Asia Pacific, and particularly Chinese, partners have driven the market demand for sustainable seafood, causing the no. of MSC label products to double in the last two years. Market development has become one a major incentives to mobilize fisheries' movement towards best practice. The MSC program covers the entire seafood supply-chain, from fishing in the ocean to consumption, regarding which the UN Sustainable Development Goal 14 on oceans reinforces the importance of small-scale and developing world fisheries for food security and economic development.

Here, we present an overview of the role for market-based solutions in shaping sustainable seafood consumption and meeting the UN Sustainable Development Goal for marine conservation. We demonstrate how the MSC's seafood eco-labelling scheme is contributing to improvements in global fishing practices and contributing to sustainable development.

48 Sustainable Energy in Spanish Universities, from the Perspective of Internal Stakeholders

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Purpose –The purpose of this study is to explore the perception of student representatives, who play a key role in university government, of the efficient energy actions, policies and performance of their campuses. The paper also offers a preliminary description of stakeholders' opinions on the different factors involved in a green campus.
Design/methodology/approach – Student representatives from 44 Spanish universities were surveyed and asked 10 specific questions related to energy on campus, and six general aspects regarding environmental performance and the principal barriers to introducing sustainable actions at their universities. Most of the responses were from different regions of the country, such as Navarra, Valladolid, Madrid, Valencia and Extremadura.
Findings – The results highlight a substantial concern regarding programs, strategic lines or energy saving plans, followed by concern regarding the question on the ecological footprint. Interestingly, the student representatives had a positive viewpoint on actions such as: energy auditing, promoting the use of renewable energy and the efficient energy design of different infrastructures. There were significant results concerning the degree of knowledge of their university's environmental sustainability performance. Furthermore, students agreed that the main barriers to introducing sustainable actions are financial variables, people's resistance to change and there being other priorities.
Practical implications – To provide a descriptive insight into the opinion of student representatives concerning thesustainable energy actions they observe in their daily activities. Students are important stakeholders that participate in the governance and policy-making of universities and contribute in a pro-active and responsible manner to the development of higher education institutions in the Spanish system.

Originality/value – The findings, implications and conclusions are valuable to university administrators, researchers and practitioners, as well as to eco-campus managers who are fostering a better quality of the environment inside and outside campuses. In addition, the potential influence of HEIs and their influence on industry and government policies engages people in the community and assumes that HEIs have a very important role in the process of transforming to a sustainable future. In this context, this study addresses the concerns of this group of stakeholders, providing a dialogue on environmental issues and the relevance of main initiatives.

49 Sustainable Energy Infrastructure through PEER

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Sustainable energy has become the need of the hour to combat increasing GHG emissions, electricity demand and to address energy storage. The deployment of smart grids help to improve reliability, grid resilience, load management, efficient resource use and thereby to develop a sustainable energy infrastructure. Around the world, while efforts are being taken in the implementation of smart grids and the rolling out of smart meters, there is a lack of market instruments or tools that help in analyzing and assessing smart grid performance. Considering this and to create a common language for stakeholders in the smart grid space, a performance based and data-driven program was developed called PEER - PERFORMANCE EXCELLENCE IN ELECTRICITY RENEWAL. PEER helps utilities (power distributing companies), critical infrastructure campuses (hospitals, data centres, airports, manufacturing units, etc.) and transit systems (metros) in assessing their electrical infrastructure using PEER indicators. This paper discusses the PEER indicators and their benefits for the project with some case studies world-wide.

50 The Assessment of Water Sustainability of the Himalayan Watershed in Pakistan under the Umbrella of Climate Change Threat

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It is generally accepted that water is a most crucial and valuable resource for human life from all perspectives, including survival and wealth. Climate change and the increasing demand for water threaten water's sustainability. The sustainability index (SI) summarizes the performance of alternative policies from the perspective of water users and the environment; it is also a measure of a system's adaptive capacity to reduce its vulnerability. In this research, the suitability of the watershed is determined using the concepts of reliability, resilience, and vulnerability on the basis of the Reconnaissance Drought Index under the climatic projection of RCP 4.5 and 8.5. The results indicate that the annual water suitability of the watershed is moving towards the poor level (less than 0.3) in the future for both projections of RCP. The aridity index of the watershed is shifting from the sub humid zone to the arid zone due to the climate changing on the basis of RCP projections.

51 The Evaluation of the Italian Industrial Sustainability System: a New Approach

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The analysis between socio-economic activities and environment ones is fundamental for planning sustainable development at global and local levels. Nowadays, productive areas have become the main focus of environmental industrial policies, being mainly responsible for unsustainable effects on the surrounding environment. Recent literature has stressed the importance of industrial ecology principles, both as objects of academic study and as practical policy tools. Industrial symbiosis (IS) is a key concept of Industrial ecology . It deals with the idea that industrial systems should be considered not as isolated "being", but in continuous exchange with surrounding human and ecological systems.The possibility of exploiting agglomeration effects makes industrial parks the central focus of environmental policies, through exploitation "agglomeration effects" . Firms have to be involved in the adoption of green behaviour towards all the drivers of sustainability in order to achieve a long-term competitive advantage.
Currently, the European Institution is promoting a reconsideration of the industrial policy goals: environmental issues are now considered an opportunity to improve innovative technology and investment, in order to create new jobs and wealth . In this context, the Italian Government has activated several policy tools for achieving the sustainability of its production systems, especially in industrial areas, also through punctual rules about industrial districts. The central role of industrial districts represents the main feature of Italian production fabric: they allow one to overcome the limits of microenterprises and SMEs, which, due to their size, have strong difficulties in detaining financial and human resources to promote local, specific features . Among the main tools, a practical model applying the principles of industrial symbiosis in industrial parks has been launched by the Italian government: the Ecologically Equipped Productive Areas (APEA) model . Despite the number of EU tools, the unified management of sustainable development in industrial areas is a scarcely developed issue.
Thus, monitoring industrial sustainability is not an easy task, given the high number of goals, processes, and stakeholders involved. By using a multi-criteria approach, the aim of the research is to analyze the progresses of Italian industrial areas towards the principles of industrial symbiosis and to highlight the determinants of green development of the industrial systems. It aims to create an assessment methodology that is able to clearly and efficiently express the constructs of cleaner production, environmental sustainability, and performance. The results show great delays in the adoption of the required procedures and in the reaching of efficiency solutions both to support the facilitation of industrial symbiosis and regional resource efficiency.

52 The Forgotten UN Sustainable Development Goal: "Ensure Availability and Access to Daylight in Cities and Buildings"

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The rapid expansion of vertical cities is a 21st century phenomenon and today their image around the world is changing drastically due to two major factors: the lack of available land and the rise in the global human population. As land becomes increasingly expensive and ever more scarce, the response of developers is to increase the density and build taller buildings to accommodate the rise in the number of people. It is estimated that by 2030, 70% of the world's population will be living in cities and that there will be 41 mega-cities with more than 10 million inhabitants.A worrying consequence of tall buildings being placed closer together is the reduction in the supply of daylight between buildings for green and public spaces, and also in indoor environments. Today it is known that daylight is indispensable for health and well-being as humans advanced under the influence of outdoor daylight conditions. The excitement of mimicking the sun by use of artificial lighting has, in the meantime, been proven to be a risky blunder. Although there are various sustainable building certification programmes such as LEED, BREEAM, MINERGIE or WELL, they do not properly credit daylight availability. By comparing different daylight modelling methods, the authors proved that the ratio of a room's floor height to its depth in historic buildings provided significantly better natural light properties than today's constructions. Additionally, current urban policies rarely contain assessments that accurately reflect the basic human need for daylight. These gaps bring essential questions into view, namely: who should be regulating the process of this complex urban development, and what aspects should future design proposals take into account?We hope that our investigation will provide guidance for policy makers, urban planners, architects, lighting designers, and developers. The results should contribute to the design of polices, methods, and approaches that are necessary in order to achieve the objective of sustainable urban development, ensuring the availability of and access to daylight as a human right.

53 The Hellenic Water Resources Monitoring Network: A Tool for Sustainable Water Resources Management

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In accordance to the European Water Framework Directive (2000/60/EC), Greece established the official national water resources monitoring network, which has systematically operated since 2012. It is coordinated by the Secretariat Special of Water Resources and operated by six bodies: the Soil and Water Resources Institute, the Hellenic Center for Marine Research, the Greek Biotope-Wetland Centre, the Institute for Geological and Mineral Exploration, the General Chemical State Laboratory, and the Water Utility of Larisa. The monitoring network consists of over 2000 monitoring points, out of which about 1392 refer to groundwater and 616 to surface water bodies (rivers, lakes, transitional, and coastal).
The Soil and Water Resources Institute is responsible for sampling and monitoring the chemical quality of rivers and lakes, and performing monthly river discharge measurements at key hydrological points across the country's rivers. Proactive measures have been designed to reverse observed trends of deterioration in time, before the quality and/or quantity status of a system is compromised. Moreover, the design of efficient flood protection measures is augmented. In parallel, new economic ventures in the form of small hydroelectric power plants are supported through the collected data. Last, but not least, a substantiated and well documented analysis of the status of identified water bodies is enabled, and based on these assessments appropriately designed measures are applied to water resources management on a river basin scale, targeting sustainable development and food security, since agricultural production is one of the key elements of Greek economy.
Hydrological analysis and the assessment of the river discharge time series, along with pressure analysis conducted at river basin scale, are the preliminary steps taken towards establishing the initial phase of converting the conventional monitoring network to the telemetric monitoring network, starting with the most critical monitoring stations across the country. It is believed that high frequency monitoring during extreme hydrological events will enable the development and implementation of efficient early warning systems that will contribute to life saving, property protection, and agricultural production support.

54 The impact of corporate governance mechanisms on the socially responsible behaviour of companies: Evidence from Europe

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Among the different functions of a Board of Directors (BoD), most research is focused on analysing its monitoring role, since the main aim of a BoD is to advise on strategy formulation and decision-making. Taking into account agency theory arguments, if there is a conflict of interest between shareholders and managers, members of the BoD are responsible for ensuring the interests of all shareholders. At the same time, several researchers argue that companies should try to satisfy all stakeholders´ demands and not only those of shareholders.
Although it has been shown that being a socially responsible company is profitable in the long term, the effects in the short term are not as clear. From this point of view, managers could exhibit opportunistic behaviour and try to minimize CSR actions so that they do not harm their personal results. In this case, the BoD should ensure that companies are committed to society and the Environment, since otherwise markets might punish them.
Considering this, the aim of this paper was to examine the kinds of corporate governance mechanisms (firm, group or individual level) that are determinant of the CSR practices carried out by European listed companies. The sample was composed of 512 listed firms in Europe for which CG data were available on Boardex Database and CSR data and control variables were available on DataStream. The period of the study was from 2005 until 2015, and this is why we employed the data panel methodology.
From the results, we expect to add more empirical evidence to this field of knowledge and to understand better which CG mechanisms are key to companies´ CSR commitment and whether there are significant differences between the countries involved.

55 The Involvement of Chinese Corporations in Africa from a Chinese Media Perspective

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China became Africa's largest trading partner in 2010, and Chinese financial investment in Africa is growing at a rapid pace. Accordingly, the role and investments of Chinese corporations in Africa have become an intensively discussed topic. In this paper, we adopt a development perspective to investigate Chinese involvement in Africa from a Chinese media perspective. More specifically, we explore the ways in which corporations' development approaches in Africa as reported in the Chinese media are similar or different to the development model adopted in China. To do this, we analyzed 90 articles about corporations operating in China and 51 articles about corporations operating in Africa published in English-speaking newspapers of four major Chinese media agencies. The data was analyzed using a combination of content configuration analysis and multidimensional scaling (MDS) within a hermeneutic content analysis framework. Our results indicate that the development outcomes and actions found in both contexts are by and large similar, there are, however, significant differences in the role of corporations as development agents. More specifically, in the Chinese context, corporations act as societal agents who manage social development, economic development, and environmental issues. In the African context, corporations act as development facilitators who provide resources, technologies, and skills to help jump-start economic and social development.

56 The Mobility Response for Sustainable Development in the Mining Region of Bangka Belitung, Indonesia

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This policy action paper aims to examine the role of local-regional government in order to measure and conduct an evaluation, thereby monitoring the effect of climate change on natural resources management and environmental degradation that leads to climate change. This research focuses on one province out of 33 provinces in Indonesia, which is known as the world's third largest tin export, called Bangka Belitung. The management of natural resources in tin mining has been conducted by people who are poorly educated, and most of them are women. This means that management lacks conservation knowledge, which has led to greatly worsening environmental degradation and dramatically increasing temperatures in this region in recent years. Indonesia's geography, culture, and institutions support sustained economic growth, particularly in the assessment of strategic and best practices relating to the high risk of poverty due to diminishing natural tin sources. In fact, Indonesia's culture and institutions, in terms of the decentralization era that has been implemented since 2000, have significantly driven local policy regarding natural resources management and exploration in terms of coo-operation with other investors/institutions within the country and among other countries. Thus, natural resource management is indicative of this developing nation's experiences of sustained economic growth, which are affected by geography, culture, policy, and institutions. Further, sustained economic growth has set a target for MDGs: namely, the 'Poverty Reduction Goal' in Post +2015 MDGs has been formulated into SDGs (Sustainable Development Goals), which are among 12 the goals of the new development agenda. The main (primary) data regarding this research are collected from field work regarding an in-depth study of key informants, FGD with the local community, and active participation in workshops by involving all regional/ local stakeholders andadministrators. Additionally, secondary data are collected to strengthen the macro analysis. The findings show that local people, who are mostly uneducated and poor women, are bread winners in their households and significantly contribute to the poor management of natural resources exploration. It can be said that a lack of mining-knowledge will destroy the environment and hasten climate change. Therefore, this research result will be very useful for many other countries in terms of exchanging experiences and knowledge on strategies related to natural resources and environment conservation; further, poverty reduction leads to sustained economic growth and development, and reduces the negative effects of climate change.

57 The Practical and Discursive Consciousness of Malawi Households in Terms of Climate Change and Their Use of Fuel Wood as a Primary Source of Energy

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Acknowledging the differences between developed and developing contexts, this study used the assumptions of Anthony Giddens' (1984) structuration theory to explore and describe rural Malawian households' practical and discursive consciousness of climate change and the use of fuel wood as a primary source of energy for various household practices. This topic is relevant amidst concerns of deforestation and climate change in the local context. Adopting a purposive non-probability sampling approach, households in the Balaka and Phalombe districts were targeted to obtain a deeper understanding of the phenomena by means of focus group discussions. Findings reveal households' use of various energy sources such as fuel wood, crop residues, and solar energy to accomplish several day-to-day household practices such as cooking and space heating. Despite their dependence on fuel wood as a primary source of energy, household members seem to be well aware of deforestation, in addition to their understanding of the causes and consequences of climate change. Some even went as far as implementing conservation practices in their everyday routines to limit their use of fuel wood as a source of energy. The findings of this study provide practical and theoretical contributions in terms of addressing the issue of fuel wood as a primary source of energy in Malawi; this study concludes with some much-needed future research recommendations.

58 The Social Dimension of Climate Change Mitigation in Third World Countries: A Abraham Maslow Based Approach

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Generally, vulnerable people are not only mere recipients of the prevailing impacts of climate change; they are also often the drivers of climate change. Climate change response measures thus depend largely on – among others – behavioral patterns, willingness and level of climate awareness of a people for a substantial success to be recorded. Therefore, this pivotal social dimensions should fundamentally shape the approach to policy making and the implementation of local climate change policies. Nevertheless, this social dimension of mitigating climate change in third world countries is usually trivialized, less elaborated or at best, approached with inappropriate methodology.Against this background, this study makes a case of Nigeria which is one the third world countries with one of the most vulnerable population. The aim is to investigate the social awareness and willingness of the people to engage in climate mitigation activities. This aim is shaped by three fundamental questions, namely; "What is the perception of climate change in the eyes of laypeople", "What is the perception of climate policies in the eyes of this vulnerable population?", "What are the factors influencing their willingness to engage in climate change mitigation activities?" These questions aim at providing elaborations on the distribution of knowledge about climate change and the willingness of the people to engage in mitigation activities. To achieve the broad aim, this study depends on open-ended semi structure interviews to draw its data. The data collected are analyzed according to quantitative research paradigm. The results obtained are further invigorated in conformism with the theory "Hierarchy of Needs" as developed by Abraham Maslow. Conclusively, this paper posit that to attain a successful propagation of goal 13 of the Sustainable Development Goals (SDG) in third world countries, the level of awareness and willingness of the people must be investigated and understood from an objective perspective and subsequently incorporated into the local mitigation policies.

59 The Spatiotemporal Characteristics and Driving Factors of China's Industrial Water Use Efficiency: An Empirical Analysis Based on Dynamic Spatial Panel Model

Fengting Wang

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Based on the location entropy index and super efficiency SBM model (SE-SBM), the paper calculates Chinese 31 provinces (municipalities and autonomous regions) industrial water use efficiency from year 2004 to 2015, and uses dynamic spatial panel model revealing the influence mechanism of industrial agglomeration on industrial water use efficiency. The results showed that: (1) the overall industrial water efficiency first increases and then decreases, the provincial water efficiency has significant spatial spillover effect and time lag effect; (2) on national level, industrial agglomeration has significant positive effect on the efficiency of industrial water, and they have inverted U relationship; (3) on regional level,industry agglomeration has significant effect on industrial water efficiency,the effect of industrial agglomeration on industrial water use efficiency in East, West, northeast area turns out the threshold effect, the northeast industrial agglomeration and industrial water use efficiency were "U" relationship, the impact on industrial water use efficiency is greater than the other three regions. Based on the above conclusion, some suggestions are put forward to improve the efficiency of industrial water use in different areas.

60 The State of Disaster Preparedness and Response to Cholera Epidemics: The Case of Indigenous Urban Communities in Accra, Ghana.

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Ghana, like most developing countries, is undergoing rapid population growth and this affects and limits the effectiveness of environmental structures. Cholera epidemics have been an 'annual ritual' and communities within the Greater Accra Metropolitan Area (GAMA) record the highest number of cases. This study assesses the preparedness and response to cholera epidemics of households, communities and local governments in indigenous communities in La and Chorkor. The research used a mixed methodology, namely a rapid assessment tool and a community-based survey. From the findings, sanitation and solid waste are the most severe environmental burdens in La and Chorkor. The socio-environmental conditions in La are better than Chorkor. Comparing the results with previous studies, the conditions in La have improved, while those in Chorkor have worsened. Based on the secondary data, there have been more cholera cases over the years in La than Chorkor, nonetheless, in 2015 the number of cholera cases was surprisingly low and this supports the assessment that conditions in the area have improved and that conditions in Chorkor have worsened. The study revealed that the preparedness and response level in La was better than in Chorkor. Although there were efforts to mitigate cholera by stakeholders, these efforts were challenged by the general apathy and bad behavioral practices of residents, the lack of cholera preparedness and a response framework and inadequate material and human resources, amongst others. The study recommended the strict enforcement of by-laws, improvements to infrastructural and social conditions, the resourcing of assemblies and a bottom-up approach to household and community education through families and clan heads.

61 The Transition from Sustainability Indicators to Sustainable Development Goal Commitments in Mexican Higher Education Institutions.

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Considering the international concern over SDGs and the advancement of sustainability in Mexico, the state government of Tamaulipas has stated its commitment with Agenda 2030 SDGs, including the Autonomous University of Tamaulipas in the state council, in order to work together for this purpose. Similarly, ANUIES, which is the Mexican Association of National Universities and Higher Education Institutions, also states its commitment to UN SDGs in its 2030 development plan. It considers five main objectives related to HEI: quality education, decent work and economic growth, reduce inequalities, industry innovation, and gender equality.
Sustainability efforts in Mexican HEI have been entirely voluntary, and there are no official sustainability indicators, regulations, or evaluations. However, the Autonomous University of Tamaulipas in México has been officially working in sustainability since 2014 through a sustainability committee, participating in UI GreenMetrics (World University Ranking) and integrating reports to AASHE STARS (Sustainability Tracking, Assessment and Rating System), achieving a Bronze medal in 2015 and a Silver medal in 2017.
This paper aims to explore the transition process of a Mexican HEI from sustainability evaluations to an SDGs perspective in order to establish its commitment to sustainable development. Firstly, it examines aspects of HEI sustainability evaluation systems currently; then, it identifies the potential relationships between indicators and SDGs. Finally, it proposes a path for SDGs' commitment to HEI in Mexico.
This work confirms that HEI collaborate with more SDGs than the five goals stated by ANUIES, generating greater responsibilities, as well as opportunities for collaboration with the state, national government, and other institutions. It also provides useful information to other HEI that are seeking to contribute to sustainable development, merging previous sustainability actions with UN SDGs.

62 To Identify Key Transmission Sectors of Industrial Water Use in Beijing: Based on Supply Chain Network Empirical Analysis

Fengting Wang

China Agricultural University

The pressure of water resources in the social economic system pays more attention to the consumption-based water resources or indirectly consumption of intermediate inputs, and the pressure mitigation for water resources as a key transmission department is less explored.This paper,based on water resource expanded input-output during 2002,2007 and 2012 for Beijing, identifies the key transmission sector of water resources in Beijing and its annual consumption changes with betweenness method, and analysis specific category industries water resource consumption features using hierarchical clustering and typology method. The results show that: (1) TKendall correlation test showed that there are significant differences in water consumption ranking measured by the betweenness-based method and other traditional input-output indexes, the betweenness method provides additional information for water use key transmission sectors that the traditional metrics unobservable observation method to find the key information for the water sector; (2) sectors with high betweenness-based water consumption change from the traditional heavy industry,such as mining sector and paper printing,to the modern manufacturing dominated by communication, automobile and electronics, and high technology service industry leaded by commercial, research and development, information services during 2002 to 2012; (3) hierarchical clustering and typology results show that the sectors corresponding to category one and category two are the key transmission sectors of water consumption in the economic system, which need more attention. The research suggests that the water resources management policy should be formulated for the key transmission departments,alleviating the water resources shortage pressure.

63 Wetlands Governance in China: Shaping and Reshaping Conservation

Linjun Xie, May Tan-Mullins, Ali Cheshmehzangi

University of Nottingham Ningbo

Wetlands are vital ecosystems in the landscape and are indispensable to achieve a sustainable and secure world that promised in the Sustainable Development Goals (SDGs), especially in the fields of food security, availability and sustainable management of water, sustainable economic growth, biodiversity, and climate change resilience. Entering a new ecological era, conservation and restoration of wetlands have become global consensus and endeavors.
In China, confronted the rapid loss of wetlands in the past decade, the government has demonstrated its commitment to develop policies for the sustainable management of wetlands: in 2013, the "Regulations on the wetland protection" was promulgated, and in 2015, "800 million mu (about 53.3 million hectares) Wetland Preservation" was added to the target for the construction of ecological civilization. However, these policies appear to fail in reining in the constant encroachment and degradation of wetlands. This paper examines the cross-cutting issue of wetland governance in China with a case of Shanghai wetlands, sheds light on the recent developments and identifies its implications for the future. Through archival research, field observation, and semi-structured interviews with key informants including governmental officials, environmentalists, scholars and local residents, this paper explores the history and current status of the wetlands in Shanghai, identifies obstacles to effective wetlands safeguard, and unveils the governance and institutional deficiencies underlying current wetland management dilemma. Ultimately, it proposes possible solutions for realizing effective preservation and management of wetlands in China.

64 Which Corporate Governance Mechanisms Drive CSR Disclosure Practices in Emerging Countries?

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Although several studies have analyzed the role that specific corporate governance mechanisms have on CSR reporting practices, the findings are not homogeneous and most of them are focused on companies from developed countries. The theoretical support for this relationship is found in stakeholder, agency and good management theories.
Considering that the previous literature suggests that the institutional environment has an important influence on the CSR reporting practices, it would be relevant for this field of research to study the influence that CG mechanisms has on the CSR disclosure practices carried out by companies from emerging countries.
Consequently, the aim of this paper is to analyse whether different levels of corporate governance mechanisms (institutional, group and firm level) as well as other organizational characteristics are determinant factors of the CSR reporting practices in BRICS countries. The final sample was composed of 281 companies from Brazil, China, India, Russia and South Africa. In order to consider different aspects of CSR reporting practices, two specific variables were to be used, namely "CSR reporting complexity" and the "GRI level". As is usual in this kind of research, the hypotheses are tested through ordinal regression models.
On the basis of our findings, we could conclude that institutional CG mechanisms influence the CSR reporting strategy of the company. The complexity of the CSR disclosure practices is affected by group level CG mechanisms in companies from family-based and relation-based societies. Regarding the GRI adoption level, group-level CG mechanisms are those which have a significant effect in the family-based environment. In rule-based countries, only the internationalization of the company has a significant impact on the CSR disclosure practices analyzed.

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4. POSTER PRESENTATION ABSTRACTS

65 A Cooperative Mechanism for Water Resources Development in the Mekong River: An Analysis Based on the Lancang-Mekong Cooperation Mechanism

Xingqiu Hu, Jinxin Zhou

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Sustained economic development in Southeast Asia has greatly promoted the exploitation and utilization of water resources in the Mekong River. However, there has been no river conservancy commission covering the whole basin in the Mekong River, which has led to slow development and many disputes. As an upstream country of the Mekong River, China has shown the willingness and strength to lead the entire development of the river basin and bring new opportunities for its sustainable development by proposing the Lancang-Mekong Cooperation (LMC) mechanism. The aim of this study is to design a sustainable development mechanism for the exploitation and utilization of water resources in the Mekong River. This paper analyses the development status and main problems of the Mekong River, and discusses the favorable conditions brought by the LMC. Accordingly, combined with the research idea of Integrated Watershed Management, this paper outlines the development planning of the whole basin and forms a cooperative development mechanism of the Mekong River under the LMC. The result can help to attract multiple stakeholders to participate in decision-making, investment, and the operation of water resources development projects in the Mekong River, in order to achieve the goals of the Lancang-Mekong Destiny Community.

66 Amphibious City: Sustainable Adaptations to Sea Level Rise in Seattle's Interbay Area

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University of Washington

Sea level rise poses major challenges to coastal land uses and therefore to urban design processes. The project was intended to create an innovative, sustainable and workable urban design plan. In the Seattle Interbay Area, the water along Seattle's Puget Sound shoreline has risen by more than six inches during the past century (Climate Impacts Group, 2013). Climate change is expected to accelerate rising sea levels during the next century. Mean projections indicate that Seattle will experience seven inches of sea-level rise by 2050, and 24 inches by 2100 (GGLO Design, 2015). While chronic inundation is a concern, sea- level rise impacts will first be noticed episodically with more frequent tidal flooding events. As a result, there is a need to inspire creative thinking on how to integrate existing and future built environments with predicted coastal processes. I intended to provide coastal communities with design concepts and ideas that create shoreline communities that address coastal hazards and preserve and enhance coastal resources. The project seeks to find the balancing point between people and nature, addressing when sea level rise will occur, and how to survive looding in the next hundred years. The design solution is an embodiment of cultural representation and the technology of stormwater management in order to achieve ecological and social resilience which incorporates life, production and ecology.

67 A New Reclamation Method for Sustainable Utilization of Mining Subsidence Land

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With the continuous growth of population and the reduction of cultivated land area, China's food security has been greatly threatened. However, coal mining in China is mostly underground mining, which inevitably causes damage of land subsidence, destroying cultivated land. This aggravates the contradiction between more people and less cultivated land. The purpose of this study was to introduce a method of filling reclamation with Yellow River sediments, that can be used to restore farmland and realize the sustainable utilization of cultivated land; to assess the properties of the soil after reclamation and crop yields in reclaimed land. This study examined filling reclaimed farmland with Yellow River sediments at an experimental site located in Jining City, Shandong Province, China. Filling reclamation procedures with Yellow River sediments were applied. The reclaimed farmland (RF) and unaltered farmland (CK) were continuously monitored for 3 years, and the soil was sampled six times. A total of 180 soil samples were collected from RF and CK. The soil properties were measured at three depths: 0-20cm, 20-50cm, 50-80cm. And crop yields were monitored regularly. The results indicate that the filling reclamation with Yellow River sediments is an effective method to restore farmland. The RF and CK soils were weakly alkaline, non-saline soils. The RF soil was suitable for the growth of local crops. With the growth of farming years, the quality of cultivated land has increased year by year, and crop yields have also been increasing. Therefore, filling reclamation with Yellow River sediments is an effective way to realize sustainable utilization of cultivated land.
Keywords: Land reclamation; Farmland; Soil properties; Yellow River sediments; Crop yield; sustainability

68 A Review of the Impact of the National Small Micro and Medium Enterprise Policy on Youth Employment and Enterprise Development: A Case of the Role of the Small Medium Enterprises Development Agency of Nigeria

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This research-based paper examines the impact that a national small enterprise development agency, established in line with policy, has had on employment creation and on the uptake of entrepreneurial pursuits amongst the youth in Nigeria. The potential extensive impact of the small, micro, medium enterprises sector in nation building cannot be over emphasised. SMMEs' contributions include job creation, expanding the means of sustainable livelihoods and ensuring impartial distribution of wealth amongst citizens. The implementation of impactful SMME policies also allow increased savings for future investments and for the effective utilization of the nation's raw materials. Furthermore, proper implementation of SMME policy also boosts the sources of income to government through tax income and contributes significantly to the Gross Domestic Products (GDP) of the nation. The locus of the present research is the Small Medium Enterprises Development Agency of Nigeria (SMEDAN) which has been mandated and empowered by legislation as a principal agency to stimulate the development and transformation of the small enterprise and informal sector of the economy. The specific site studied was that of its operations in Akure, Ondo State. The research relied extensively on the meta-analytic technique in examining the official and unofficial reported impact of the policy as overseen by the agency towards achieving the stated aims for its establishment. The core dimensions of the investigation included (a) the extent to which the guiding policy is implemented as intended from a monitoring and evaluation point of view, (b) the impact of the policy on employment creation that benefits the teeming youth of the country and (c) ultimately, the extent to which the policy and the agency have been effective in overall enterprise development. By adopting a monitoring and evaluation approach, the preliminary findings appear to be pointing to a number of unforeseen, and in some instances, self-inflicted negating factors that appear to be inimical to the achievement of the desired objectives. Since the goal(s) of enterprise development are always on-going, this paper proposes the adoption of a longitudinal monitoring and evaluation (M &E) framework in order to ensure that what is planned for or intended is actually what is achieved as far as the impact of SMME on youth employment and enterprise development in Nigeria is concerned.

69 An Empirical Study of the Influence of the Transaction Network among Companies on the Triple Bottom Line

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The aim of this research is to empirically verify the impact of the transaction network among companies on the triple bottom line, i.e. sustainability indicators such as environmental, social and financial indicators. Corporate activities that enhance sustainability indicators are expected to enhance corporate stakeholder relationships, support long-term company growth, and enhance corporate profitability. However, many previous empirical studies have failed to find a significant correlation between sustainability and financial indicators. This research focused on the structure of the inter-company transaction network within an industry as an intermediate variable between sustainability and financial indicators. As a research question, we examine the assumption that not only the efforts of a single company, but also the relations among companies in the supply chain greatly influence the resolution of environmental or social problems and the profitability of the company. This study's research methods were to construct and subsequently analyse databases on business connections and triple bottom lines using the social network analysis method. As the subject of analysis, the automobile industry and the electronics industry were analyzed. As a result of the analysis, it was found that companies in the automobile industry with higher network centrality had higher sustainability indicators and higher profitability. Additionally, companies with high sustainability indicators also had suppliers with high sustainability indicators. As a whole, the automobile industry had a strong correlation between sustainability indicators and profitability. In the electronics industry, companies with higher network centrality did not necessarily have higher sustainability indicators and higher profitability; as a whole, the industry's correlation between sustainability and financial indicators is weak. To conclude, in order to raise both sustainability and profitability, the role of the central companies in the industry's transaction network is significant. An avenue for future research is to analyze other industries and to undertake an international comparison study.

70 Building Innovative Mechanisms for International Cooperation: Lessons Learned from the China-Ghana/ Zambia Renewable Energy Technology Transfer (RETT) Project

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International technology transfer and cooperation have been encouraged and gained much attention to address global challenges in the context of economic, social, and ecological development. Potentially, technology transfer brings out cooperation, but it may lead to concerns about competition or even economic exploitation. This research aims to study the mechanism of technology transfer and cooperation by examining an ongoing trilateral technology transfer project, i.e., the China-Ghana/ Zambia Renewable Energy Technology Transfer (RETT) project. With the financial support of Denmark, the RETT project is led by UNDP and implemented by the governments of China, Ghana, and Zambia.
This research studies what has motivated the project development and how the domestic and international partnerships of a variety of public and private actors have formed and developed, which have influenced the outcomes of the project. The performance of the project is assessed from the perspectives of policy development, technology transfer, knowledge-sharing, and cooperative platform building. Both primary data from interviews of involved parties and secondary data from literature are used.
Some features of the project are generalized: the project is taken as an initiating project of the North–South–South Cooperation, which aims to achieve policy, market, technological, and economic benefits from a broader perspective; the project is demand-driven and focuses on technology transfer and capacity building, rather than direct material assistance. Besides, the research presents lessons that learned from the project in terms of the capacity building, partnership governance, technique standard formulation, and policy integration. The study provides an empirical, in-depth study of an international technology transfer project among international donors, China, and other developing countries. It intends to promote discussion about China's technology transfer policy and provide useful insights regarding the improvement of international inter-governmental policy cooperation.

71 Causes of Household Food Insecurity: Implications for Food Production and Sustainability in Rural Areas of Kano State, Nigeria

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University of Nigeria Nsukka

The incidence of food insecurity and poverty are particularly devastating in developing countries. In Nigeria, the majority of households are food insecure, especially rural farming households. This indicates that reducing rural food insecurity is very important to reducing overall food insecurity and achieving the related SDG. Hence, this study was conducted to ascertain the perceived causes of household food security in six rural areas of Kano state where intensive crop farming is practiced by rural farmers. A multistage sampling technique was used in selecting one hundred and twenty respondents . Descriptive statistics, logistic regression and the food security index were used to analyze the data. The findings indicated that a greater percent (33.3%) of the households were engaged in food, cash crop production and animal rearing. Also, the major crops produced were cereals such as maize (85.0%), sorghum (49.2%) and millet (45.8%), among others. Though the majority (86.7%) of the respondents ate three times daily, they consumed mostly carbohydrate-containing foods. Using the food security index, 74.2% of the households were classified as food secure, while 25.8% were food insecure. The results of the logistic regression in determining the food security status of the household revealed that educational level (z = 1.95), sex (z = 1.99), household size (; z = -4.29) and access to credit (z = 2.40) were significant socio-economic determinants of food security. The food insecure households indicated that the perceived causes of their food insecurity were mainly poor extension services (M = 2.46), large family size (M = 2.34) and poverty (M = 2.28). The study therefore recommends that the government should provide incentives to extension agents so that they can adequately disseminate improved agricultural technologies to farmers. This has the potential to raise efficiency in food crop production and enhance farmers' sustainability of food.

72 Climate Knowledge Translation to Action: The Case of Maasai Pastoralist Adaptation Knowledge Network in Kenya

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In Kenya, pastoralists have managed the natural grasslands using practices that often result in overgrazing, low productivity, and low income. This has caused environmental problems, which could be exacerbated by climate change. Although knowledge on practices that increase pastoralists' capacity to adapt to climate and environmental challenges are currently available, the adoption rate by pastoralists remains poor. Hence the growing interest in understanding the role of social networks in facilitating the adoption of adaptation knowledge by pastoralists. This study used the social network analysis (SNA) to assess the flow of climate adaptation knowledge to pastoralists in Kenya. The intent is to identify the factors shaping knowledge flow and adoption in adaptation action. Knowledge Mapping workshop, Key Informant Interview, and a questionnaire survey were used to identify the key organizations operating in the generation, brokering and dissemination of adaptation knowledge to pastoralists. We explored two networks of configurations: i) relations of collaboration in knowledge production and ii) relations of collaboration in knowledge dissemination. We used three measures of network cohesion; density, core-periphery, and degree centrality to analyze the network structure and influence on knowledge flow and adoption. Findings revealed an impressive social integration in the network with research institutes, NGOs, and CBOs identified as among the central actors in the network based on their degree centrality. Further, we observe a high density of ties among actors in the knowledge production network than the dissemination network. The low density of the dissemination network indicates few activities by key organizations in ensuring that generated knowledge reaches the users. This also results in poor feedback process from local pastoralists to knowledge generators and brokers. Hence the need for action targeted at improving activities and feedback mechanism of the dissemination network as a means of capturing pastoralists perspectives of the relevance, reliability, and usability of communicated knowledge for action aimed at reflection and revision as a way of ensuring that generated knowledge is in sync with pastoralist context.

73 Conversion of Gasoline to CNG and Its Impact on the Jakarta Economy (An Analysis of the Social Accounting Matrix)

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The aim of this study was to analyze the impact of the revocation of fuel subsidies by the government. The impact was analyzed through the effect of the conversion of gasoline to CNG policy scenario on the land transportation sector, which is one of the ways to reduce the dependence on oil and develop sustainable energy in Jakarta. The data used was from the social accounting matrix (SAM) from Jakarta in 2012. The impact of the revocation of the fuel subsidy and the conversion of gasoline to CNG was calculated using the multiplier effect method using the SAM. In addition, the determination of the transmission path of the conversion of gasoline to CNG in the household sector was analyzed using structural path analysis. The empirical results on the multiplier effects indicated that the policy of converting gasoline to CNG through the limitation of gasoline supply for the public land transport sector will increase household income. The policy of converting gasoline to CNG along with the revocation of the gasoline subsidy and the development of gas infrastructure will more greatly benefit middle to lower class households. The increase of institutional income in Jakarta due to the conversion of gasoline to CNG is estimated to be used for food, board and services. The results of the structural path analysis state that the impact of the implementation of the conversion of gasoline to CNG for households will be more effective when transmitted through capital production factors and production labor.

74 Corporate Social Accountability: Enforcing Ethical Goals through Board Accountability

Jingchen Zhao

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Corporate social responsibility (CSR) has been adopted in company law legislations in a number of jurisdictions. The regulation of CSR has been criticised for being fundamentally flawed, or else merely window-dressing in the domain of corporate law. This article aims to consider and address some of these problems and assess how CSR could be refined and elevated through the lens of board accountability. The notions of CSR and board accountability will be linked and investigated historically and theoretically, supported by discussion of their common nature, scope and trajectory, so as to enable CSR to be more appropriately and effectively applied in corporate law. The concept of Corporate Social Accountability (CSA) will be introduced and evaluated with the aim of broadening its latitude beyond disclosure. By providing a much needed new notion for company law, the introduction of CSA will reduce current contestability through sorting, comparing and advancing this complex field of enquiry.

Key words: Corporate Social Responsibility, Board Accountability, Corporate Social Accountability, Corporate Law, Enforcement

75 Demographic Trends of European Metropolitan Areas and Their Impact on Sustainable Development

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The globally growing trend of urbanization is present in Europe, as it is worldwide. The dynamics of socio-demographic processes, although slightly different from country to country within the EU's 28 states, follow a similar trend. Positioned globally as a non-polluting actor, producing intelligence that in turn generates revenue, the European continent is very much concerned with demographic issues. The aim of this paper consists in analyzing demographic and socio-demographic data of European metropolitan areas and investigating their correlation with socio-economic indicators. The obtained results will be used to design optimal sustainable development polices according to economic, technological and environmental contexts. The first objective is focused on identifying the main demographic trends of European urban areas, based on the assessment of several main indicators, such as the rate of urbanization, the rate of population growth, the rate of natural increase, age structure changes, the employment rate, and migration. The second goal is directed towards evaluating the dynamics of several development indicators from the economic sector (GDP per inhabitant, GDP per employed person, employment, and the unemployment rate) and the socio-economic field (poverty and social exclusion by degree of urbanization, income inequality, satisfaction and quality of life, and education level). Our study will be enhanced by taking into consideration the environmental component. The results obtained will be used to perform correlation analyses between demographic trends and the main socio-economic and environmental indicators in order to reveal the impact of the demographic dynamics of European urban areas on their sustainable development. An important finding of this paper consists in revealing the main patterns of urban development by performing a multidimensional study based on Principal Component Analysis. Moreover, hierarchical classification techniques will be used for identifying main clusters of metropolitan areas development and describing their profiles. The conclusions obtained will be used to design and implement appropriate strategies and policies in order to achieve smart, green, and inclusive development.

76 Designing an Environmental Education Program to Encourage Pro-Environmental Behavior in Santiago De Chile

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The growth of the world population and the levels of consumption, along with the high value that modern societies give to economic prosperity, have created a pressure on the planet that is putting at risk the satisfaction of the needs of the current population and that of future generations. However, on the other hand, awareness of the environmental damage caused by current levels of consumerism has increased, and this has translated into the consideration of promoting environmentally-friendly behavior. This work attempts to develop an environmental education program to promote pro-environmental behavior that can be applied in homes in the municipality of Ñuñoa, Santiago, Chile. For this purpose, first a diagnosis of the pro-environmental behavior present in the homes of the commune was carried out. Five key domains such as food, housing, mobility, consumer goods and leisure, were assessed through an online survey (n = 384). In a second stage, the information obtained from the survey allowed us detect the presence or absence of pro-environmental behaviorsand thereby establish the issues to be addressed. Finally, in a third stage, with the results obtained we were able to design an environmental education program to address the lack of eco-friendly behavior in Santiago, Chile.

77 Driving All to Create the Sustainable Lifestyles through Daily Details

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Climate change is a global challenge that does not respect national borders, races, or cultures. Since the adoption of the 2030 agenda for sustainable development, many countries have adopted this agenda at national and local levels, but actions by these alone will not be sufficient, and the success of reaching this goal will only be possible through joint endeavour. Governments, civil society organizations, the private sector, the scientific community, and other stakeholders, and in particular, individuals, all need to play their part. The transition toward a sustainable world requires behaviors to change [1]. Individuals have to become central to ensuring a sustainable future. People are accustomed to dealing with sustainable development as a process to minimize their carbon footprint; attention is often given to air travel with its large emission, while some small day-to-day changes may be overlooked [2]. The obvious daily details that can be changed include clothing, food, shelter, transportation, and so on ("衣食住用行"as the saying goes in Chinese). Globalization has made individuals powerful actors in our world economy, and our daily choice can have a global, social, economic, and environmental impact, both today and tomorrow [3]. It is a pressing issue that requires solutions that need to be conducted at the personal level, and it requires the creation of sustainable lifestyles to help the world move toward a sustainable future. Thus, this work is mainly focused on the creation of sustainable lifestyles. We aim to make sustainability apparent in everyday life, including clothing, food, shelter, and transportation, and to promote sustainable practices.

Reference:
[1] Salonen A, Ahlberg M. 2011. Sustainability. 4(3):134-142.
[2] Editorial. 2018. Nature Climate Change. 8:1.
[3] UNESCO. 2018. Education for Sustainable Development. https://en.unesco.org.

78 Effect of Tourism on Sustainable Urban Development

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Tourism industry is one of the fastest growing industries worldwide. According to the data published by the UNWTO, the number of international tourists is expected to increase up to 1.6 billion by 2020. Most tourists visit large cities as their destination, but the history of city tourism in the academic field is very short and little research has been done relative to its influence. Especially the effect of physical environment on city tourism is a critical agenda in contemporary tourism research since the importance of spatial uniqueness is increasing.

Therefore, this study aims to analyze the effects of the cityscape on city tourism satisfaction and to identify streetscape elements that influence the cityscape satisfaction. In other words, the purpose of this study is to examine the impact of urban factors in city tourism and how it varies from cultural background of the tourists. Total 466 foreign tourists from China and Western countries were surveyed and 37 tourists were interviewed. The survey results were analyzed using ordered logistic regression. The result of the interviews were used to confirm and specify the analysis of the survey results and to select the questionnaires for the survey.

Three urban factors(cityscape satisfaction and satisfaction on street vitality) were measured along with nine other tourism factors which can affect the overall tourism satisfaction. The questionnaires were asked in pairs; what the tourist expected and what the tourist experienced. The satisfaction was measured as the difference between the two.

The results of the ordered logistic regression show that satisfaction on cityscape has the most effect on average tourist satisfaction for both group of tourists. The satisfaction on lively streets however has higher effect on the satisfaction of Western tourists than Chinese tourists. Consequently, the Western tourists are more sensitive to urban factors than Chinese tourists.

79 Embodied Energy Assessment of University Buildings in Tropical Climate (Within Life Cycle Assessment)

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In recent years, huge attention has been drawn on the study of embodied energy due to significance of embodied energy in every building life cycle stages. Worldwide researches have shown that building embodied energy can range from 2% to 80% as compared to operational energy. In Singapore, with vision to be the greenest campus in the world, Nanyang Technological University (NTU) has committed to achieve this vision through various green initiatives. This includes technological implementations in its campus buildings to reduce operational energy intensity. With great improvement in operational energy intensity, the impact of embodied energy in buildings will become more significant. Due to lack of large scale embodied energy study on university buildings, it is in need to establish such study to access the carbon footprint of campus buildings. This research focuses on the study of NTU's 21 academic buildings embodied energy intensity. Hence, this makes NTU the first campus in Singapore and Asia Pacific to conduct a large-scale investigation of its buildings' embodied energy. In this study, Building Information Modelling (BIM) software is used to investigate the embodied energy of NTU building materials. Case studies were also conducted on non-conventional structured buildings that include Wave Sports Hall (Timber structure) and Prefabricated Prefinished Volumetric Construction (PPVC) residential halls to make embodied energy comparisons with conventional buildings. Preliminary results show that NTU material embodied energy is around 9% as compared to operational energy, with an average material embodied energy intensity of 530 kWh per m^2. There are ongoing researches on other building life stages, which encompasses transportation, construction and end of life that will contribute another 5-10% to overall building energy. These findings will serve as Singapore first embodied energy benchmark data and future development references for university campus in tropical regions to access campus contribution towards global carbon footprint.

80 From Waste to Biochar–the Economic Potential and Climate Impact of Biochar as an Export Good from Nutrient-Rich to Nutrient-Poor Regions

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The two-edged problem of simultaneous overuse of nutrients in industrialized agriculture and nutrient depletion in the soils of poor countries has led to eutrophication, soil degradation, food insecurity, and carbon emissions. The closing of the nutrient loop and the recovery of nutrients from waste flows prevents eutrophication and might also create economic incentives in nutrient-rich regions. The aim of this study is to evaluate the economic potential and climate change impact of biochar made from waste and side flows, and its feasibility as an export fertilizer from nutrient-rich to nutrient-poor regions. Biochar sequesters carbon; thus, the economic potential is primarily measured in the context of carbon trading and the monetary benefits it might offer, even when the target market is insolvent. The case country of origin is Finland, and the case markets with nutrient depletion are the solvent Qatar and the insolvent Ethiopia and Ivory Coast markets. In Ethiopia, there is a nitrogen deficit, and in Ivory Coast, phosphorus deficit is especially severe. Life cycle cost methodology is used for economic potential analysis and life-cycle assessment for climate change impact comparisons.

81 Green Manufacturing Policy, Environmental Performance, and Industrial Development: An Empirical Study from Chinese Textile Industry

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"Green manufacturing" policies are environmentally oriented industrial policies made by the Chinese government, which considered the environmental impact of industry during the policy making. These policies are also designed to promote coordinated development between environmental protection and industrial growth. However, empirical, quantitative research on the effect of these policies is still limited. In this research, we matched data from China's industrial economic database and China's industrial pollution database, evaluated textile industrial "green manufacturing" policies made by the local government, and studied the effect of these policies on the coordinated development between environmental protection and industrial growth. This research was based on more than 100,000 firm-level data and various indicators, including enterprises' scales, subsidies from the government, total output value, annual waste water discharge, and so on. The results of the research indicated that industrial development policies, which considered environmental impact, would significantly reduce industrial waste discharge. Meanwhile, these policies did not have an obviously negative effect on the economic performance of the enterprises. According to an analysis using the theoretical lens, these "green manufacturing" polices can partly overcome "government failure". Furthermore, these policies also can construct a "source-control" and an environmental friendly industry based on the principle of industrial ecology. Finally, this research could guide the government to develop new policy instruments for improving the effects of traditional environmental regulations.

82 Information Transparency and Corruption : Evidence from China

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Corruption prevailing in developing countries hinders the sustainable development of society and the economy. Theoretical studies argue that information disclosure can curb corruption, and some empirical study results support this view, but others do not. This paper uses Chinese panel data from 31 provinces from 2008–2015 and the fixed-effect model to empirically analyze whether information disclosure can effectively control corruption. The robust results show that the level of information disclosure was significantly negatively related to the level of corruption. Based on these results, this paper suggests that the government should assume their social responsibility through multiple channels and methods to expand the scope of information disclosure and deepen the extent of information disclosure to reduce social corruption.

83 Limitations and Prospects of Improving Beef Cattle Production in the Emerging Sector: A Case of Limpopo Province, South Africa

Obvious Mapiye[1], Godswill Makombe[2], Kennedy Dzama[1], Cletos Mapiye[1]

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The opportunity for the emerging beef farming system to support the growth of South Africa's livestock industry is untapped. Slow growth of the sector is attributed to many limitations that affect the emerging beef farming sector. The objectives of the current study were to identify and characterize the systemic challenges and constraints that confront emerging beef farmers in the Limpopo Province, South Africa. Data collection involved interviewing all the 62 farmers under the Limpopo Industrial Development Corporation (IDC)-Nguni project using structured questionnaires. The sample was predominantly males (87%) and adults aged over 45 years (88%). Close to half (47%) of the respondents had tertiary education. Major ecological and production challenges reported as percentages of respondents were drought (96%), rangeland degradation (94%), diseases (89%), feed shortage (86%) and inadequate water (82%). Nearly 50% of the respondents ranked the extent of these challenges as high to very high. Results indicate that poor access to finance, lack of infrastructure and poor access to markets were some of the key limitations reported by more than 80% of the respondents with above 50% ranking them as high to very high. Logistic regression models showed that respondents' perceptions to the majority of the challenges were largely influenced ($p<0.05$) by education, access to formal training, farm size and age. Given all the limitations found, current findings point to the prospects of designing strategies that support knowledge flows and capacitate the farmers with skills to combat the challenges.
The research was supervised by Prof K. Dzama and Prof G. Makombe

84 MEPCM-PV Application for Reducing Winter Chilling Damage on Aqua Farms

C.J. Ho, Wei-Len Chou, Chi-Ming Lai

National Cheng-Kung University

Fishery production in Taiwan relies heavily on aquaculture, with a total area of about 55,674 hectares. Milkfish are widely farmed in southwestern Taiwan. Milkfish can survive in temperatures of more than 10°C and are generally farmed in water at temperatures greater than 15°C. However, during the winter season, when cold currents arrive, the water temperature may drop suddenly. With radiation cooling at midnight, the temperature may drop below the living temperature for milkfish and result in milkfish death. Therefore, the use of microencapsulated phase change material (MEPCM) as a heat storage medium in fishponds during the winter was investigated.
In this study, a MEPCM layer was attached to the back of a photovoltaic (PV) panel to form a MEPCM-PV module that floated on the water surface. Subsequently, numerical simulations were used to determine if this PV module could effectively store solar radiation energy at the bottom of the MEPCM layer and release it to the below-surface water at night during the winter season. The investigated parameters included the melting point (18 and 17°C) and thickness (5 and 3 cm) of the MEPCM. The result shows that the PV treated with a 5 cm / melting point 17°C MEPCM layer effectively released the energy that was stored during the daytime to the water. This energy release provided a local high temperature area for the aqua farms during cold weather and reduced the cold damage.

85 Natural Ventilation Effectiveness of Round Wall-Mounted Vent Caps in Residential Kitchens

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This study explores the effect of different numbers of vent caps and their installation locations on the air contaminant (carbon monoxide) distribution and airflow patterns in residential kitchens. The study focuses on round wall-mounted vent caps, which are typically located on the exteriors of residential kitchens in Taiwan. The ventilation performance of a vent cap was examined with wind tunnel experiments, and the indoor air environment was analyzed by computational fluid dynamic (CFD) numerical simulations. The results indicated that the installation of a kitchen vent cap can reduce the average carbon monoxide concentration in the cook's breathing zone. A sufficient quantity of vent caps and the correct installation location are required to ensure the effectiveness of vent caps.

86 Resilient Cities—Storm Water Management Solutions for Historical Environments

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Gdańsk University of Technology, Faculty of Architecture

The issue of urban sustainability is becoming increasingly related to the adaptation of cities to climate change and their increasing water-resilience. The urge for such adaptation becomes critical in the context of global rapid urbanisation, the unprecedented rise of cities, and the sprawl of urban areas towards the countryside, along with the massive rise of impervious surfaces. This results in the constant of lowering the water table and frequent urban flooding. While general strategies of storm water management are well defined, the more detailed methods of strengthening water resilience of cities vary considerably, depending on geographical locations, as well as social and cultural conditions.
In this paper, we present original studies on the increasing resilience of cities, which are not only focused on water management efficiency and ecosystem services, but also embedded in the cultural and structural identity of urban environments. Our studies involve revealing historical dynamic changes in water contours in the chosen cities located in the Baltic Sea region. We prove that that the former lines of brooks, streams, urban basins, and canals that today are very often cut-off, covered with earth, or converted into sewers could be re-opened and creatively re-invented. As such, they could serve as different kinds of reservoirs for stormwater runoff that vary in scale, technological support, and structure—from temporary urban rainwater gardens, canals, and basins, to engineered constructed wetlands. While increasing the adaptive capacity of cities to heavy rainfall, they stimulate the emergence of vibrant public spaces, strengthen biodiversity, and, as being rooted in the history, enhance the spatial and cultural characteristics of the particular city.
We hope that the presented approach toward increasing the water resilience of cities may be included as a part of a guideline for cross-border cooperation focused on the developing climate adaptive strategies for water-sensitive historical urban environments in the Baltic Sea region.

87 Risk Assessment of a Sponge City Construction Project Based on Social Network Analysis

Jiyong Ding, Juefang Cai

Hohai University

As one of the "Thirteenth Five-Year Plan" projects in China, the construction of sponge cities is conducive to promoting the transformation of the traditional concept of urban construction and the sustainable development of modernized urban agglomeration development on the basis of ensuring the ecological security of urban water. At the same time, as a system requiring complex engineering, sponge cities have many risk factors. These risk factors are accumulated, transmitted and amplified, which ultimately leads to difficulties in the construction of sponge cities. At present, there are few studies on the risk system of sponge city construction projects, with studies more concentrated on some aspects such as PPP investment and financing. Through a literature review, questionnaire survey and case analysis of the Zhenjiang City Sponge City Construction Project, this paper establishes a pyramid analysis framework of risk sources from four aspects: urban background, technical support, economic base and social organization, and identifies relevant risk factors. A risk network adjacency matrix is constructed and the social network analysis method is used to obtain the key risk factors at the core of the risk network. The intermediate center of the line is used to identify the key relationships in the network, and a more targeted risk management strategy is proposed. The aim is to provide a new way for the project manager to fully understand and control the risk of the sponge city construction system. At the same time, it also provides a reference for the effective development of sponge city construction and the sustainable development of the city.

88 Seasonal Changes of the Urban Forest Cool Island Effect in the Central District of Changzhou, China

Xinjun Wang

Changzhou Institute of Technology

Urban forest can form a cool island effect and mitigate the urban heat island effect. Research reveals the seasonal changes of the urban forest cool island effect in the central district of Changzhou, China. Firstly, we used the Radiance Transfer Equation (RTE) method to retrieve the four Landsat 8 remote sensing images of 2017 to represent the different seasons. Secondly, we used the Thermal Field Index to study the spatial distribution of Urban Heat Island (UHI) and the Urban Forest Cool Island Effect (UCI). Lastly, we investigated the tree density, height, diameter at breast height (DBH), leaf area, and carbon sequestration of 18 parks in the central district of Changzhou to analyse the relationship between these impact factors and the urban forest cool island effect. The result shows the distribution variation of the cool island effect in different seasons: Autumn＞Winter ＞Spring ＞Summer; the intensity variation of the cool island effect during different seasons was Winter ＞Autumn ＞Summer ＞Spring. In the high temperature seasons (summer and autumn), the impact factors have a significant correlation with land surface temperature, while in low temperature seasons (winter and spring), there is no significant correlation among them. This study clarifies the seasonal changes between urban forest and the cool island effect; it has important guiding value for urban forest planning and design, and may help mitigate the urban heat island.

89 Spatial Development Initiative for the Syrian Coastal Region: A Model of Sustainable Urban-Rural Networks.

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This paper focused mainly on integrated spatial regional planning (ISRP) for sustainable development. Multi-spatial urban-rural linkages are proposed to build a new scenario for balanced spatial regional networks in the Syrian coastal region. The sequential approach adopted quantitative and qualitative methods for the interpretation and discussion. Thus, the aim was to test the regional networking hypothesis by using remote sensing techniques and the TOWS matrix to identify the types of urban-rural linkages and monitor the movement of urbanization in the target area to propose a balanced strategy seeking ruralization. The study also applied game theory to coordinate relations between actors within networks, and government authorities in areas with environmental sensitivity. Accordingly, this research enhanced the participatory regionalism approach and formulated a strategic framework for effective urban-rural linkages for the geographic units "rivers basins" in the southern part of the coastal region to scale up/out lessons across the region as a spatial development initiative (SDI) for sustainable development. Hence, this scenario classified as a mixed approach presents one of the essential scalable strategies for sustainable reconstruction in Syria after the war.

90 Sustainable Agricultural Production through GIS-Based Groundwater Studies in North India: Issues and Challenges

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Haryana, one of the northern states of India, falls under the Indo-Gangetic alluvium. It is well known for its rich granary and ranks second among the contributors of wheat to the central pool of India. The study area comprises the Kaithal district of the state, famous for wheat and paddy crops, and covers an area of 2317 km^2. About 90% of the total area is covered by alluvial plains and the thickness of the alluvium varies from 250 m to 805 m. The changes in rainfall patterns over a period of more than 35 years and concomitant change in the groundwater conditions, in terms of both quantity and quality, is posing a new threat to the sustained production of agriculture. The present study deals with the analysis of variations in the depth and quality of groundwater vis-à- vis groundwater development and climate change from 1974 to 2009. Land use, geomorphology, seasonal fluctuations and groundwater prospects, depth and quality maps were generated in a GIS environment. It was found that the average water level in the district receded from 6.21 m in 1974 to 19.16 m in 2009, with a net average decline of 1.5 m per year from 19741999, compared to more than 11 m over the next ten years. Up to 1998, the rainwater was able to recoup the groundwater losses to some extent, however, during the last decade even the post-monsoon depths were found to be lower than the pre-monsoon depth. Moreover, the pH value changed from 8.1 m in 1997 to 7.54 m in 2007. Similarly, the TDS values changed from 637 to 1360 mg/l, the TH values from 172 to 173 mg/l, EC from 1061 to 2267 µS/cm, SAR from 5.6 to 16, RSC from 1.4 to 2.8meq/l, and the PS values changed from 44 to 81 percent over a period of 10 years from 1997 to 2007. It has been observed that the decline in the depth of the water levels is associated with a decline in quality, which poses a threat to the farmers who use it for agricultural activities. Suitable measures for remediation are suggested.

91 Sustainable Development at the University – the Gap between Education and Practice

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Universities and higher education institutions are social institutions which essentially form the core of the science system with their activity in areas of research, teaching, and services. Universities are responsible for contributing to the future-oriented development of society. Future-oriented development is today determined by "Sustainability". For the university practice sustainable development is mainly related to the research and educational areas, there are many literature sources discussing education practices in the sustainable development. No doubts, Universities have an exceptionally important role to play, because sustainable development needs social acceptance, which has to be supported and advanced through education for sustainable development. But we cannot forget that universities as the business or nonprofit organizations should also consider the sustainable development as the strategic aim in their operational practice. This approach is forgotten many times that is confirmed also in lack of literature sources describing this problem. This approach is extremely important because the practical example of sustainable actions and practices of the universities can be the best confirmation of sustainable knowledge they would like to teach and no doubt the examples to follow are the best teaching methods.
Therefore the aim of this paper is to analyses the university sustainable development education in relation to their sustainable practices. The authors' research opinions of university scientific staff, technical staff as well as students on university involvement in sustainable development practices. Then they compare it with sustainable development education and determine the gap between education and practices. The study sample consists of universities staff and student in southern Poland as well as universities in other European countries.

The results of the studies are theory review on sustainability education in higher education as well as measuring the practices of universities in sustainable concept introduction. The recommendations are elaborated to decrease the gap between theory and practices of sustainability in education and practices realized in universities.

92 Sustainable Heat and Power Production through the Integrated Design of Industrial Waste Heat Recovery and Solar Thermal Network Systems Incorporating Periodic Heat Storage

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Energy use in industries and homes has become a major issue of concern due to increased greenhouse gas emissions and the high profile of expenditure on utilities required for heating, cooling and electricity. This situation is further compounded by the increasing global population and industrial activity, especially in developing countries, where most urban expansion is currently taking place. This has resulted in more emissions and environmental pollution because utility production is still largely fossil-intensive. Meanwhile, studies have shown that between 20 – 50% of industrial energy input is released as waste-heat to the environment (in form of exhaust heat, waste streams and cooling water). Hence, changes that promote energy efficiency and environmental sustainability in energy systems are needed.

Industrial waste-heat recovery is a proven energy-saving concept that could reduce emissions in industrialised cities. The heat recovered could be reused by the same plant where it was rejected or by several participating processing plants through an inter-plant heat sharing Network, while the surplus heat can be utilized in regional heat integration to satisfy domestic heat/hot water needs or for power generation. Moreover, given the substantial amount of solar irradiation throughout the year in most developing African nations, integrating solar thermal and periodic heat storage with such an industrial waste heat recovery design has the potential to gradually replace conventional energy generation systems for both heat and power supply, thus reducing energy-related emissions.

This work presents a systematic framework for the optimal design of regional integrated heat network system where industrial waste-heat and solar thermal are coupled with a regional heat/power system. The concept adopted involves synergising between energy efficiency and renewable energy resources as well as the systematic optimization of both design and operation Parameters, considering the economic and environmental performance of the system. A preliminary overview of the design justifies its technical feasibility and practical application with an equitable, low-emission heat sharing network. This presents an innovative and sustainable energy system for cities, especially cities in Africa, where an integrated renewable energy system is still lacking.

93 Sustainable Management of Veteran Trees as Keystone Habitats for Urban Biodiversity

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The majority of the world´s population lives in urban areas, which expand rapidly. Urbanization has many implications for urban biodiversity and vice versa, and biodiversity in urban areas is important for quality-of-life conditions for people. Urban areas often include green areas (parks, large gardens, woodlands, etc.) that support a wide variety of animal and plant species. Keystone habitats for natural species in urban green areas are veteran tress. Veteran trees can be defined as trees that are of interest biologically, culturally, or aesthetically because of their age, size, and condition. This concept embraces trees through its historical, cultural, and aesthetic value, as well as its habitat value. Veteran trees have the potential to be both habitats for some rare/endangered species and stepping stones for species dispersal within ecological networks in urban areas.
Thus, veteran trees are an important part of bio-cultural heritage in urban areas.
Sustainable management of veteran trees in urban areas is a very important topic, which includes issues related to safety of people (risk of branch fall, etc.) and issues related to sustaining veteran trees as habitats. Research aimed at non-destructive methods supporting management practices of veteran trees in cities with the applyication of new technologies is needed. This paper is focused on applying acoustic tomography to the assessment of veteran trees in urban areas in order to support the sustainable management of these interesting and important components of urban environment. This case study is located in the city of Prague (Czech Republic), which is world-famous for its architectonical heritage wand its connection to natural heritage. This study presents the main principles and discusses future perspectives and constraints of applying acoustic tomography as a decision support tool for the sustainable management of veteran trees as keystone habitats for urban biodiversity.

94 The impact of deregulation on achieving clean energy portfolio standards

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Introduction
Clean energy technologies are an important part of the portfolio of climate change mitigation options. However, high initial costs make it hard to deploy these technologies at a scale that will have a substantial impact on the trajectory of greenhouse gas. In many cases, innovations and commercial adoption of these technologies depend on financial support from governments. Government financial support for clean energy technology includes research and development funding, demonstration projects, and deployment subsidies. For instance, global public funding for renewable energy research and development (R&D) reached 8 billion in 2016. Current annual investments in energy technology approach 50 billion USD for research, development and demonstration, 150 billion for market formation, and 1-5 trillion for diffusion of mature technologies. This includes over 200 billion of investment in renewable energy. Such investments have driven rapid technological innovation. For instance, the cost of land-based wind power, utility and distributed photovoltaic (PV) solar power, light emitting diodes (LEDs), and electric vehicles (EVs) in the United States has fallen by 41-94% since 2008.
The impact of deregulation on deployment of clean energy technologies have been the subject of few studies in the past. Deregulating markets may bring new competition and choices to the customers, stimulate environmental differentiation, and explore an untapped appetite for clean energy consumption. On the other hand, deregulation may result in lower prices and higher consumption of Dirty technologies. In the U.S. in particular, many states have developed renewable portfolio standards (RPS) to increase the share of Clean energy in the electricity market. Empirical studies of RPS policies in the U.S. have shown that deregulated markets have lower percentages of clean energy technologies compared to regulated markets. Here we ratify this empirical findings and show that deregulated markets provide a more attractive environment for developing clean energy subsidies with lower penetration rates. In contrast, regulated markets are better suited for clean energy technologies with higher market share mandate.

Objective of the study
The objective of our study is to compare the impact of market structure on the amount of subsidy needed to achieve renewable standards. Prior work has focused on the role of deployment policy on technological innovation, the empirical impacts of deployment policies, or the impacts of multiple policy instruments, such as standards and taxes. Studies that focus on social welfare typically compare different kinds of policy instruments in the same market structure. As a result of this gap, governments have little existing guidance about the potential impacts of deregulation on clean energy technologies diffusion.

Method used
Here, we use demand curves to study the impacts of deregulation on clean energy technologies subsidies. In particular, we compare the size of subsidy that grantees a certain market share for clean energy technologies in regulated and deregulated markets. We consider how market structure will affect deployment policy. This work informs policy design questions as governments and policymakers consider the continued use, and expansion of, deployment subsidies around the world.

Main results obtained
We compare subsidies in two market structures by identifying a critical market share that can be achieved by allocating equal amount of subsidy in both market structures. At market shares smaller than the critical value, the benefits of competition favor allocating subsidies in deregulated markets. Above the critical market share, smaller subsidies can achieved higher market share in regulated markets. The critical market share depends only on the cost ratio of energy technologies. For technologies with lower relative cost, deregulated markets are preferred when the target market share is relatively small. However, regulated market subsidies are more effective with a relatively high cost and high target market share. In other words, deregulation helps relatively cheap clean energy technologies to achieve relatively small market share targets.

95 The Impact of Existing Trade Policies on the Import and Sale of Fish from Sub-Saharan Africa in the Cape Town Metropolitan Area.

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Abstract
Fish remains a vital source of food, income, nutrition, and livelihood for millions of people in Africa. This study investigated the modalities of trading in fish imported from sub-Saharan Africa into South Africa in the Cape Town Metropolitan area. This research analyses the opportunities and constraints faced by retail fish traders and importers regarding the South African and Southern African Development Community (SADC) policies that are in place, to ascertain how far the policies go in facilitating the intra-regional fish trade. In addition, the study analyses consumer factors underlying the attractiveness of imported fish, the channels used for importation, and the types and forms of fish imported into South Africa. The study employs a qualitative approach using semi-structured interviews with purposively selected key informant retailers, traders, and City of Cape Town officials to collect the information. Findings show that shop owners and traders face challenges in relation to obtaining the required documents for trading, sanitary and phytosanitary certification, and tariff and non-tariff barriers at borders. Some of these challenges include long and tedious procedures to acquire documents, as well as the limitations placed on the amount of goods traders can import. Consumers (mostly from the diaspora) prefer the taste of fish that they are used to, thereby creating an increasing demand for imported fish. National and regional policies put in place do not facilitate the trade in fish as well as current municipal regulations for retailing imported fish and other food types. The study also raises critical questions about the implementation of sanitary and phytosanitary standards by officials in the food shops. The thesis concludes that is it critical for national and regional policies to be coordinated and harmonised for enhanced intra-regional fish trade, which could contribute towards increased food security, nutrition, and livelihoods.

96 The Relationship between Population Trends and Urban/Rural Sustainable Development Indicators, from the Perspective of Regional and Global Economic Convergence

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Urban and rural sustainable development and management represents an important topic from the perspective of the Horizon 2030 Strategy, and is mentioned among the main objectives. Therefore, the assessment of urban/rural development level is a matter of great relevance for achieving sustainable development and improving quality of life.There are many criteria that can count as factors influencing the degree of urban and rural development, such as economic, social, cultural, or environmental factors. The first purpose of this paper regards defining the most important influence factors and identifying the main rural/urban development typologies, as this stage influences the level of investigation, at both regional and global levels. Another important issue is directed towards the analysis of the relevant factors and indicators that are appropriate for assessing the development of both urban and rural areas. By determining and quantifying the importance of the relevant factors using weights, several aggregate indicators for evaluating urban and rural development are proposed. The final purpose of this paper consists in investigating the relationship between population trends and urban/rural development indicators, in light of regional and global economic convergence. The results can be used to design and implement appropriate policies in order to achieve sustainable development. The proposed methodology is illustrated using a case study for European Union vs. Asian countries.

97 The Sustainability of the Water Supply in a Coastal Community on the Small Island of Tarakan, North Kalimantan

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Coastal communities are known to be vulnerable to water needs. They are largely isolated, vulnerable to natural hazards, and climate variability inhibits their ability to obtain adequate water resources to support their lives. Hence, finding a sustainable water supply provision model is a sensible way to address these uncertainties and vulnerabilities. However, achieving a sustainable water supply is a challenging issue, as it is influenced by various factors from an environmental, social, economic, technological and institutional perspective. This study assessed the water supply problem by identifying key variables that affect its sustainability. Data were analyzed using the approach of multidimensional scaling. The analysis showed that the multidimensional system of clean water supply on Tarakan is sustainable, with 13 sensitive attributes that have an effect on increasing the sustainability index. The attributes are divided into three attributes in the environmental dimension, three attributes in the economic dimension, two attributes in the social and cultural dimensions, three Attributes in the infrastructure and technology dimensions, and two attributes in the legal and institutional dimensions. To improve the long-term sustainability status, the scenario that needs to be implemented to improve the provision of clean water is a prolonged-optimistic scenario that makes a thorough improvement to all sensitive attributes.

98 The Threat of Malaria and HIV to the Survival and Sustainable Development of Africans

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The shockingly high prevalence of HIV and malaria in African countries continues to undermine the development prospects of the continent. While the sustainable development goals propose ensuring healthy lives and promoting well-being for people of all ages, the proposal is far from being realized, especially in sub-Saharan Africa, despite the adoption of various national, regional and global initiatives in response to these epidemics. The soaring prevalence of the diseases have distinguished the region as the present center of an increasing global pandemic. Malaria and HIV are leading causes of maternal and infant mortality and their continuous spread is a potential threat to African survival. This paper takes as its premis the standpoint that health is an essential component of any human development and improving the health of people enhances the quality of life, thereby ensuring a better future. The health sector is critical to social and economic development, with ample evidence linking productivity to the quality of health care. This paper asserts that in order to keep African countries on track to achieving the proposed world transformation by 2030, which is the ultimate goal of sustainable development, all hands must be on deck to ensure a combined effort geared towards improving on existing interventions and fashioning innovations specific to Africa in a bid to control these life-threatening epidemics.

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5. PAPERS

99 A Tale of Two Basins: Assessing Potential for Return Flow-Neutral Water Trading in the Interconnected Tagus and Segura River Basins in Spain

Carlos Dionisio Pérez Blanco[1], Carlos Gutiérrez-Martín[2], Arthur Hrast[1]

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Coupled with human-induced climate change, growing population and changing distributions of wealth increasingly result in local and regional imbalances between water supply and demand. As the cost of expanding supply exceeds the economic benefits of marginal uses, policy-makers are constrained to shift priorities from damming and storing water resources for economic growth to *reallocating* available resources among uses, so that economic growth and social welfare are maximized without compromising the sustainability of vital water ecosystems. Water markets allow the reallocation of water to its most valuable uses and represent an opportunity to increase production without adding further strain to water bodies (*producing more with the same*). Most efficiency improvements through water markets will happen in agriculture, the largest human consumptive use and that concentrating the marginal (i.e. least valuable) uses of the resource. Critically, in water scarce and/or drought-prone areas where water is a limiting factor, trading water entitlements from low to higher value added farms often equates to trading water from *technically* inefficient to technically efficient farms (measured as the ratio of water consumed to water applied). Since entitlements are defined in terms of water withdrawals, this can harm downstream users not directly involved in the transaction via higher consumption, diminished return flow, unreliable water supplies and deteriorated water quality. Empirical evidence suggests that these outcomes are likely to occur under similar circumstances and have been reported in water markets in Spain, Australia, Chile and the US. Hence, economists recommend avoiding the return flow impacts of water marketing as much as possible by limiting trading to the seller's consumptive water use. The natural question that follows is: *what is the potential of water markets to enhance economic performance once return flow externalities are internalized?*

Agricultural water markets research has delivered a better understanding of farmers' behavior and an increasingly accurate characterization of farmers' motives and responses. Yet, the economics discussion around the issue of return flow externalities is still in an early stage, with major problems persisting. This paper aims to shed light on this discussion by means of assessing the potential and limitations for inter-basin water trading between the highly profitable, technically efficient agriculture of the Segura River Basin (SRB) and the low value-added, technically inefficient agriculture of the Upper Tagus River Basin (UTRB) in Spain. Both basins are connected through the Tagus-Segura Water Transfer (TSWT), the largest water infrastructure in Spain, with the capacity to convey up to 1 billion m-3 every year from the Tagus headwaters to the Rio Mundo river basin, a sub-basin of the SRB and located 242 km away from the UTRB. The TSWT was originally designed to support an ordinary transfer, i.e. a reallocation not emerging from market exchanges. Yet, the maximum legally transferable volume was soon capped to 600 million m^3 per year, a figure that has rarely been reached since the TSWT was built (average annual ordinary transfer between 1979 and 2009 equals 305 million m^3). This leaves significant idle capacity available for trading.

During a particularly intense drought in the SRB in 2005, the approval of the Royal Decree 15/2005 facilitated a temporary inter-basin market leveraging on the excess capacity of the TSWT. One year later, inter-basin trading had surpassed all previous formal water exchanges within the SRB, rapidly becoming the largest water market in Spain. This created significant expectations on the ability of the TSWT to fill in the expanding supply-demand gap in the SRB through trading. However, there is controversy regarding the return flow externalities stemming from the trading of water withdrawal entitlements (rather than consumption), and the amount of water that could be realistically exchanged once they are internalized. Concerns over the negative economic and environmental repercussions inter-basin markets may have on the UTRB and the Tagus River Basin (TRB) in general has led to conflict and institutional lock-in, with some suggesting that there is still much potential in the TSWT to be untapped through trading, and others claiming that once return flow externalities are accrued, benefits from trading will be significantly reduced.

The aim of this paper is to assess both the economic and environmental viability and potential of a return flow-neutral water market in the interconnected Tagus and Segura river basins, and explore the economy-environment tradeoffs that stem from relaxing the neutrality principle. To this end, the paper relies on a hydroeconomic methodological framework that couples, using a sequential modular approach, a Positive Multi-Attribute Utility Programming (PMAUP) microeconomic model with the Soil and Water Assessment Tool (SWAT) eco-hydrologic model. PMAUP techniques are used to elicit the parameters of a non-linear objective function that captures irrigators' motives and behavior. Once calibrated, objective functions are used in a series of simulations in which the water allocation constraint is gradually strengthened and agents have to adapt through crop portfolio decisions. The PMAUP simulation module measures changes in utility (i.e. shadow price of water) and calculates the compensating variation that addresses foregone utility from reduced water allotments. We perform this operation in the areas of the Tagus River Basin (TRB) and SRB connected to the TSWT to reveal the supply and demand schedules for inter-basin trading under alternative water scarcity and return flow scenarios, and thus illustrate the viability and potential of water trading. The environmental impacts of water trading

in the UTRB are assessed using SWAT, a comprehensive, semi-distributed eco-hydrologic river basin scale model capable of providing the means for the simulation and assessment of the relationships between the impacts from land and water management on hydrologic, biogeochemical, and ecological processes in a river basin. The combination of both models enables the development of an integrative framework capable of linking economic and eco-hydrologic systems and assessing economy-environment tradeoffs in water exchanges.

100 Access-Based Consumption: The Perceptual Shift toward Consuming Physical Resources Collaboratively

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Introduction: Despite the promotion of car sharing and public transport, cities report increasing car use and concentration of businesses in urban areas, demanding space that exceeds the current supply. If vehicle use is not decreasing, legitimising this by providing more car parks is not a solution that sits well within the framework of a sustainable world. Shared carparks are a temporary action that may shift more stubborn user perceptions of access over ownership (and thus be the first step toward car sharing or alternatives).
Focus: This study explores consumer attitudes and behavioural intentions toward the collaborative consumption of shared services. A collaborative service network is explored, and determinants of user participation essential to such a network are identified in relation to benefits to users and the community.
Research Questions: Attitudes and intentions toward collaborative consumption more generally play a significant role in influencing how one might respond to a contextual sharing economy offer, yet there is little research that examines the two in conjunction. Thus, the following research questions are explored:Do positive general intentions toward collaborative consumption practice significantly predict attitudes and behaviours in a specific collaborative consumption context? What are attitudes and behaviours moderated by? What is the relationship between attitudes and behavioural intentions in this context?
Methods: The study reports survey data gathered from employees of businesses located in congested urban areas, where demand for car parking exceeds supply. Six motivational determinants toward two different (equal access vs primary user model) shared parking scenarios were explored using regression analysis.
Main Results: In regard to an equal access or a primary-user model of collaborative consumption, the primary user model was preferred, with a sense of ownership reported to outweigh concerns over difficulty of use. Perceived difficulties in equal-access models were highlighted, yet perceived gains in personal reputation and peer approval outweighed these.

101 Accessibility Measurement of Socially Vulnerable Groups to Urban Green Space: The Context of Dhaka City Parks, Bangladesh

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The study estimates the accessibility score of socially vulnerable groups to Dhaka City Corporation (coordinated to 23°42′ N 90°22′ E) parks in Bangladesh. Urbanization is currently one of the global development agendas. Based on Sustainable Development Goal 11 (SDG 11), 'Make cities, and human settlements inclusive, safe, resilient, and sustainable', the United Nations extended the SDG Agenda by adopting the New Urban Agenda in 2016. The social benefits supplied by urban green space (UGS) to city dwellers are vital to maintain and increase the quality of life. UGS is essential to mitigating the summer high surface temperature, and are vital in air pollution removal and noise abatement. Vulnerable social groups include women, religious minorities, and ethnic groups. The metropolis is a highly compact city with 46,997 people per square kilometer. It has 54 parks covering 8.5 percent of green spaces and the score of per capita green space is very low. A total of 25% of open green space is judged to be a sustainable portion for the quality of life of urban dwellers and this is deemed the lowest numbers of playgrounds, parks, other open spaces and swimming pools per capita. Some of the Dhaka City parks have already been occupied by homeless people, hawkers, and some have been converted into temporary markets, bus stops, slums, etc. The study aims at estimating the accessibility rate of socially vulnerable groups to the green spaces (parks). In addition, it sets the goal of identifying different obstacles to access to parks. I will apply satellite imagery raster and vector data in showing the geographic location and distribution of the parks. Data were extracted from Google Satellite (https://www.google.com/maps). Raster data was converted into vector features. I analyze imagery data using QGIS 2.18 Software and Google Earth Pro. I employ a cost-weighted distance approach and social demand index (SDI) to measure the degree of accessibility of socially vulnerable groups to urban green spaces (parks). I selected six Thana (sub-districts) out of 40, which include Kotwali, Shahbagh, Ramna, Gulshan, Sher-E-Bangla Nagar, and Shah Ali in the Dhaka City Corporation. The results show that Kotwali Thana has the highest accessibility rate (0.47%) and Sher-E-Bangla Nagar Thana is the least accessible (0.18%), and that park distribution is not equitable. It is worth noting that Kotwali is a densely populated and small area and Sher-E-Bangla Nagar is a less compact and larger Thana area. Sustainable accessibility is essential to the quality of urban life. Thus, the research findings can be useful to policymakers to formulate a sustainable urban green space management policy.

102 Allotment Gardens and Urban Sustainable Development: A Case Study of Beijing from the Perspective of the Users

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With the worldwide urbanization process, environmental degradation—together with ecological fragility—is emerging in an endless stream, which imposes a pressing demand for environmentally friendly modes of urban development. Allotment gardens (AGs), mainly located within the city or peri-urban open spaces, are now increasingly being incorporated into city life as a strategy of urban sustainable development. It is also the only opportunity to involve the city's inhabitants in gardening and cultivation. However, research regarding the AGs' distributions and their users in Beijing is scarce.

Therefore, the main objectives of this paper are to explore the spatial distribution, and users' behaviors and their evaluations of current AGs in Beijing. Then, corresponding improvement measures will be proposed in order to promote a reasonable plan for continual AGs in China's urban areas, which could contribute to urban sustainable development. The research methods adopted are questionnaires, a field survey, and interviews. Results were analyzed by SPSS and GIS.

There are four main results. First, AGs in China—especially in the first-tier developed cities—are constructed in urban areas, but in actuality they are situated in remote suburban and rural areas. Second, users participate in AGs with three main motivations: growing healthy food, obtaining physical exercise, and entertaining themselves. Third, the overall evaluation of AGs is between high level and low level. High level is for landscape and facilities, and low level is for service and guidance. Lastly, users' evaluations of provision of tools, seeds, and fertilizers; sanitary facilities; and service attitudes have had a statistically positive influence on the overall evaluation of AGs.

103 An Assessment of Groundwater Quality for Drinking Purposes: A Case Study of Mukula Village, Limpopo Province, South Africa

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The supply of potable water in the right quantities remains a challenge in most developing countries. Alternative sources of drinking water are thus explored at communal and individual levels. This study presents the water quality of 40 private boreholes used in rural areas of South Africa. Physicochemical parameters were measured using standard methods, anions were measured using an automated Ion chromatograph (IC), and microbiological water quality parameters were analyzed using membrane filtration method. Structured questionnaires were employed in obtaining the current water use practices of residents in the community. Water quality indices were used to describe the current state of the drinking water. The results showed that pH from the samples ranged from 5.54–7. Electrical conductivity (EC) and total dissolved solids (TDS) for all the samples ranged from 300–1180 µS/cm and 140–589 mg/L, respectively. Turbidity ranged from 0–14.95 NTU, with six households exceeding the recommended WHO and SANS guideline. F, Cl, SO_4, Mg, K, and Ca concentrations in the collected samples complied with the recommended guidelines. NO_3 and NO_2 concentrations ranged between 2.37 and 16.43 mg/L and 0.85 -12.35 mg/L respectively. Microbial analysis showed high levels of occurrence of the various organisms that were tested for. In the samples, the occurrence of the test organisms are as follows: 20%, 70%, 28% 35%, and 62.5% occurrence of Vibrio cholera, Vibrio parahaemolyticus, Salmonella spp., Shigella spp., and Escherichia coli were detected in the samples, respectively. Survey data showed that 70% of the respondents used groundwater as their primary source of drinking water. Only 13% of the respondents treat their water using bleach or by boiling before drinking. Although the water quality index showed that the water is of a desirable quality when only the chemical parameters are considered, the water is unfit for drinking, as high levels of microbial contaminants have been discovered in it. The point of the use of water treatment focusing on microbial contaminants is a priority in these regions.

104 An Assessment of Home-Users' Acceptance of Solar Powered Electricity in Lagos

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The adoption of green buildings has been identified as a tool for combating Greenhouse gas emission in modern cities. Electricity generation and utilisation forms a major source of Greenhouse gas emitted from residential buildings. This informs the current clamour for the use of renewable energy for powering such buildings. Solar powered electricity continues to earn global relevance in the housing sector, albeit at a slow rate in developing countries like Nigeria. Using the Technology Acceptance Model (TAM), this study assesses the acceptability of solar powered electricity among residential electricity users in Lagos. Existing scales from previous literature are employed and TAM instruments are developed and modified in a questionnaire form and administered in a survey. The participants for the survey are selected using a stratified random sampling technique, to cover residents in the 16 local government areas in metropolitan Lagos. The data is analysed using both descriptive statistics and structural equation modelling. The results of this study form relevant contributions to the current global discourse on the promotion of renewable energy and related policy formulation. The study also produces results to aid investment decisions in the green housing and solar energy markets.

105 Belt and Road Investment: Reconceptualising the Stakeholder Theory in Line with "Belt and Road" Philosophy

Chandni Patel

Center for International Business Ethics

This paper presents an alternative holistic approach towards rethinking corporate sustainable responsibility (CSR) in appreciation of the underlying philosophy of China's Belt and Road Initiative (BRI). In line with the China-endorsed "win–win" philosophy, the paper argues that CSR implemented in BRI-related Chinese investments ought to recognise the interdependencies that exist not only between a business and it's stakeholders on a bilateral basis, but from a multilateral stance, in and amongst the entire ecosystem of stakeholders affected by the company's decisions.

Accordingly, it is suggested that stakeholder theory, as an anlaytical model for strategising CSR, takes on a more integrated approach. In doing so, it is believed that better risk management may be secured, ensuring that the impact 'ripples' of management decisions are accounted for from the outset. In turn, BRI-related projects will become better able, on a private level, to safeguard wider stakeholder interests and secure long-term success, whilst on a public level, to enhance their compatability with BRI principles, philosophy, and overarching aims.

In drawing this connection, the paper examines the BRI concept and framework as articulated from three official sources:

1. President Xi Jinping's Opening Statement to World Leaders at the Belt and Road Forum 2017
2. The Action Plan for BRI as articulated by The State Council of The People's Republic of China, and
3. The explanatory guidance on Building the Belt and Road as delivered by the Office of the Leading Group for BRI

Underlying these sources, the main philosophy and principles of the BRI shall be noted via open coding techniques to identify those key words and phrases (indicators) repeated most often, and representing commonalities between all three. In turn, these indicators shall not only be explored for their inherent meanings, but shall be directly compared to the underlying principles of the holistic take on stakeholder theory as conceptualised by R. Edward Freeman. Comparisons shall reveal a striking similarity between the two ideologies, supporting the notion that BRI-related projects ought to strategise CSR utilising a more holistic approach: *aligning* stakeholder interests as opposed to *balancing* them.

Consequently, the author shall devise an alternative model for stakeholder theory, and a management framework for applying it within the decision-making process. In doing so, a novel theoretical approach towards CSR shall be delivered, noteworthy in its direct application to the BRI and its ability to entrench BRI philosophy at a private level.

106 Concepts and Methodologies of Data Informed Approaches for Sustainability – a Relational Approach for Policy and Research in Monsoon Asia

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Multi-lateral international organisations have called for a data-led sustainability approach. There is also a loud chorus about "end of theory" from sections in academic and the corporate world. The objective of this paper, are two folds, first, is to ascertain the potential and challenges of data-driven approach, and second, developing tools and frameworks in attaining sustainable development in Monsoon Asia for both policy and research.
First, exploratory research with comprehensive global databases on sustainability indicators, open data and big data, and similarly, empirical investigation on different "data initiatives" in India, Thailand and Cambodia was conducted. Second, the authors conduct knowledge structuring by identifying concepts and connections which are missed, and introduce the concept of "inter-relational scales".
The authors find in India and Mainland south-east Asia; there are NGO led data/knowledge aggregators who maintain a repository of information on broad topical discussions. However, post-2010, the authors find data being collected and supported by diverse stakeholders and, the collected data is primary and on specific thematic issues in India. Data initiatives in Monsoon Asia region have been used as a "first line perspective tool", which calls for further research and theory. There is a need for concepts and scales to connect different data points, further, also policies within governance and policy which give space to non-government partners.
In comparison to universal/pluralist, systems/analytical, social/ecological, and structure/agency dichotomy, the authors emphasise the importance on interrelation scales like practices, institutions, and landscapes. Anthropogenic pollution from land creates most of the impact on land, sea and atmosphere. Use of institutions is prevalent among social scientist, and practice theory connects the dialectic between human agency and structure. The authors thus argue the use of the three inter-relational scales can represent both an ecosystem we live in and its social ramifications.

107 Creating Urban Agglomerations as a Means to Increase the Efficiency and Sustainability of Regional Development

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The article examines the main trends in creating agglomerations and megalopolises in Russia and other countries. The authors explain why it is necessary to further develop agglomerations near the major economic centres of the Russian Federation, which is particularly crucialin the post-crisis era. An objective of creating urban agglomerations in Russia is to raise the competitiveness of its regions, to jump-start economic growth against the challenging background conditioned by the external macro-environment, and also to solve certain geopolitical problems by forming centres of geopolitical influence, that is, to manage vast territories with small populations. Furthermore, the article justifies the need to create an "agglomeration belt" along the borderline of Russia, examines basic principles of forming an effective agglomeration, and identifies the main positive and negative aspects related to creating agglomeration structures. The authors claim that properly designed urban agglomerations allow one to solve important social and economic problems of the region, and enhance regional stability against external disturbances by means of emerging economies of scale, cost reduction, control augmentation, and financial economy. The present study formulates the main tasks to perform in order to achieve these goals.

108 Environmental Performance and Eco-Efficiency of Communitary Crops of Quinoa in Ecuador

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Nowadays, Quinoa (Chenopodium quinoa) is a trendsetter crop considered by FAO as a great source of vitamins proteins and mineral and it is a gluten free pseudo cereal. For these reasons, we fix as objective of this research: to determine the Life Cycle Analysis (LCA) of communitary systems that produces Quinoa in Ecuador. For the study it was essential to carry out an inventory of the LCA, in such a way that the inputs (inputs) and outputs (outputs) of the agricultural phase were obtained, which starts in the preparation of the soil until the industrial phase in the packing of the quinoa and the transport. The data collected in the agricultural phase were through interviews, observations, analysis of soil samples, plant structure of quinoa and fertilizer, while interviews and field observations were conducted for the industrial phase. Defining the system from farming to gate according several studies in the sector and using a bag of 25kg of Quinoa as functional unit.
The eco-efficiency indicator was defined as Quinoa yield per single environmental impact index, including global warming as a global environmental category and aquatic eutrophication as a regional one. The results indicate that eco-efficient Quinoa production can occur in conventional and communitary crop conditions, with a Quinoa yield obtained by an adequate application of nitrogen fertilizer. The mitigation of aquatic eutrophication caused by the excessive use of nitrogen fertilizer is an important factor in improving the eco-efficiency of Quinoa production. The importance of evaluating the life cycle analysis of a product/service, lies in knowing the different environmental impacts, from its initial process to its final disposal and how to solve for the reduction thereof; encouraging and promoting the sustainable production of national products.

109 Literature Analysis in Sustainable Supply Chain Management: Leadership Style and Culture

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Government policies require companies to adopt sustainability practices and be accountable for their emissions. For companies to be truly sustainable they must consider all three dimensions of sustainability (economic, environmental and social). However, this remains a challenge due to the complexity associated with the implementation of sustainability, as a result organizations are exploiting the appropriate methods for integrating the three pillars of sustainability. This paper seeks to illustrate primarily how the organizational culture and leadership style influence the successful implementation of sustainability in an organization; it also aims to examine whether there is a link between leadership style and sustainability and/or organizational culture and sustainability. The paper also proposes a sustainability framework based on the leadership triangle.
Keywords: Supply chain management; sustainability; sustainable supply chain management; leadership style; organizational culture.

INTRODUCTION

The wide spread of natural disasters such as storms, flooding, drought and heat waves have reached a higher level than expected (Jha, 2005). This is linked to climate change, which is in part a result of high carbon emissions relatively generated from supply chain activities (Jason and Camilla, 2006). A worsening situation is expected if pragmatic policies are not implemented to encourage sustainable supply chain management, consequently reducing carbon emissions in the supply chain. As more firms adopt environmentally-friendly practices such as recycling (Jain and Sharma, 2014; Zhu et al., 2007), deliberate actions are being taken to implement strategies that will promote sustainable measures (Alessia et al., 2009), improve their operations, and restructure their business framework by integrating sustainability practices into their supply chain management. Sustainable supply chain management (SSCM) might be the appropriate means to extend the responsibility of business organizations from being conscious with regard to reducing pollution and waste to taking full responsibility for their product lifecycle, from procurement to final disposal (Suhaiza et al., 2012). Carter (2008) observes that organizations that strategically undertake sustainability will achieve higher economic performance than those which pursue only some of the three components of the triple bottom line (Carter and Rogers, 2008). There is a great deal of research into factors of sustainability, but very few touch on how the leadership style and organizational culture influence the successful implementation of sustainability. This paper illustrates the ways in which organizational culture and leadership style influence the successful implementation of sustainability. It also seeks to assess the link between leadership style and sustainability and/or organizational culture and sustainability and finally proposes a sustainability framework based on the leadership triangle.

This paper is structured as follows: (1) literature review on supply chain management, sustainable supply chain management and sustainability; (2) examination of the current debate on the present state of the integration of the three dimensions of sustainability; (3) study of the relationship between leadership style and organizationl culture and (4) conclusion.

110 Mechanism for Improving the Sustainability of Homestead Food Gardens in Gauteng Province, South Africa

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Homestead Food Garden Projects are supported by the government, which is attempting to alleviate poverty in food insecure households. Despite the fact that homestead food gardens are seen as a solution to food security in Gauteng province and other parts of the world, the issue of the unsustainability and failure of these programs after government support ceases cannot be ignored. Household surveys were conducted in Gauteng province by the Agricultural Research Council (ARC) and Gauteng Department of Agriculture and Rural Development (GDARD to establish a sustainable mechanism for homestead food gardens in the Gauteng Province. The following objectives were addressed: identify socio-economic factors that influence the sustainability of homestead gardens; assess the production practices of homestead gardens owners and conduct a natural resource audit. A total of 1150 households participated in the study and were spread as follows: City of Johannesburg (319); City of Tshwane (270); Ekurhuleni (141); Sedibeng (216) and West Rand (204). A questionnaire written in English and using quantitative and qualitative designs, stakeholder discussions and field observations were part of the data collection. A purposive sampling technique was used to select 1150 households from the list provided by GDARD. Data was coded, captured, and analysed using SPSS.The results indicated that most of the households were female-headed, with the majority falling above 56 years of age, and all households were practicing open field production. The food security status (accessibility, availability and utilization) was also in line with the fact that South Africa is food insecure at the household level in contradiction to the national level. It was further established that 405 households on the department list are not gardening; some households in other districts felt that the household gardens initiative is very good (371), good (490), fair (191), poor (70) and very poor (28). The majority of the households felt that the support given by the department is good, as households received tools and seeds as starter packs. It was also established that in terms of sustainability, not all household gardens are economically viable (971 gardens not generating income), socially (531 households not supporting social initiatives) and environmentally sustainable (884 households unaware of environmental issues). Correlation results also indicated a positive association among the following variables: availability of garden, household members, age, household income and gender. Some of the study recommendations include: regular water supply, environmentally friendly soil improvement techniques and pest control; involvement and participation of the community in homestead programme design, implementation and evaluation (two-way channels for information exchange is instrumental to achieving sustainable, improved gardening practices); technical assistance, demonstrations and training; nutrition education within the gardening activity and monitoring is critical as it serves as a tool to ensure that activities are carried out as planned and to improve performance as required. The results of this study will facilitate the identification of problems and the development of solutions based on sharing between households and the Department of Agriculture and Rural Development.

111 Study on Low-Carbon Commuter Travel Behavior Based on the Sor Model

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To mitigate atmospheric pollution, it is important to persuade people to travel using the low-carbon mode. What are the main factors affecting low-carbon travel behavior and its contribution to low-carbon travel intentions? From the perspective of consumer behavior of transportation service, this paper analyzes the main factors affecting commuters' low-carbon travel intentions based on the SOR theory. We select the following: the surrounding support, environmental protection, publicity and living environment as external environmental stimuli (S,; commuters' environmental attitudes as a body (O), intrinsic perception, commuters' low-carbon travel intentions as a Response (R), and building the traveler intention model of low-carbon commuting travel. By conducting a stated preference survey in seven representative cities across China, 2028 valid questionnaires were obtained, and empirical analysis was conducted using SPSS24.0. Reliability and validity analysis showed that the internal consistency and validity of the scale were high. The results show that (1) The external environment has a direct and significant positive impact on commuters' low-carbon travel intentions; (2) Intrinsic perception has a significant positive effect on commuters' low-carbon travel intentions; (3) Commuters are different. The external environment has different effects on intrinsic perception; (4) The results of the mediating effect show that there is a partial or complete mediating effect of intrinsic perception between the external environment and commuter's low-carbon travel intentions.

112 The Impact of Pollution Exposure on Commuters' Intentions to Choose Low-Carbon Travel Options

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Vehicle exhaust emissions are one of the main causes of air pollution. Studying the choice of people's low-carbon travel mode from the micro level has important significance in guiding people to reduce car travel. Will air pollution exposure affect travelers choosing the low-carbon transportation mode? Based on the Theory of Planned Behavior and the value-belief-norm theory, this paper establishes an integration model of the Planned Behavior Theory and the value-belief-normative theory. Using 2082 data collected from the questionnaires of seven major cities in China from September to October in 2017, structural equation model technique is used to study the influence of air pollution exposure to commuters' low-carbon travel mode choices according to travel distance and travel time by SPSS software and Mplus software. The study finds that: (1) Air pollution exposure has a direct positive impact on commuters' low-carbon travel mode choice intentions; air pollution exposure indirectly affects low-carbon travel mode choice intentions by making a positive impact on commuters' personal norms and social norms. (2) When the distance is greater than 15 kilometers, the impact of air pollution exposure on commuters' low-carbon travel choice intentions is not significant. With travel distances becoming longer, the chance of commuters choosing the low-carbon travel mode is smaller. (3) When commuters' travel time is longer than 45 minutes, air pollution exposure has no significant effect on commuters' low carbon travel mode choice intentions. The longer the travel time, the less obvious the intentions of the commuters to choose the low carbon way to travel.

113 The Projection of Green Technology Development in an Emerging Country -A Case of Nigeria

Oludaisi Adekomaya

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Scientists around the globe are currently faced with increasing environmental problems as energy utilization becomes more complex and cumbersome. These emerging problems force the scientific community around the world to evolve new approach to combat the effect of fossil fuel utilization. Green technology has provided solution to many difficulties being experienced in many developing countries in order to stay ahead of these challenges. This research work projects some of the aspects these evolving technology will have on material utilization as raw material base in Nigeria market starts the incorporation of green materials for sustainability which ultimately reduce its environmental impact of fossil fuel. This research works also explores new process for generating energy with zero tolerance for environmental degradation as reported in many published works. Also discussed in this work is the four generalized phases of life cycle of materials which ranges from raw material acquisition, production, use and final disposal or recycling. The sustainability performance of green energy in Nigeria is also x-rayed taking into consideration the future energy use in Nigeria.

114 Using Indigenous Knowledge to Protect the Environment and to Respond to Climate Change in Nigeria, Africa

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As we adopt the new Sustainable Development Goals in Africa, indigenous knowledge may prove to be "the single largest knowledge resource not yet mobilized in the development enterprise". Africa contributes least to but suffers the most from the disastrous consequences of climate change. How can the continent cope with the worsening threats of flooding, droughts and other emergencies that result from extreme weather conditions? For a long time, African customs and traditions were misperceived as irrational and incompatible with the conventional strategies of development. However, the current global economic and environmental crises have exposed flaws in the Western model of development and of the mitigation and adaptation to climate change. Marshall Sahlins has rightly emphasized the need for all peoples "to indigenize the forces of global modernity and turn them to their own ends", as the real impact of globalization depends largely on the responses developed at the local level. This paper considers how indigenous knowledge and practices can be used to protect the environment, and support climate adaptation in Africa. Although poverty may sometimes force people to use resources unsustainably, most traditional African societies have deeply entrenched ideas about environmental protection and sustainability, because their livelihood depends largely on the land and on the stability of the ecosystem. They believe that land and other forms of nature are sacred, and are held in trust by the present day users on behalf of dead ancestors and future generations. Chief Nana Ofori Atta of Ghana once told a colonial official that "land belongs to a large family of which many are dead, a few are living, and countless hosts are yet unborn". The paper presents the indigenous knowledge movement as an appropriate way to respond to climate change and to other global and external impacts. While Africa stands to gain from global science and international best practices, indigenous knowledge offers a model for rethinking and redirecting the development process, and for enlisting positive traditional values and institutions in a way that enables and empowers local actors to take part in their own development. Development agents, researchers and donors, who often assume a knowledge or capacity vacuum in Africa, should instead try to tap into the vital resource of indigenous knowledge for locally appropriate ways of forecasting weather systems, traditional techniques of soil management, pest and disease control, adopting suitable crop and animal varieties, and so on.

6. SPEAKERS

Keynote Speakers

Mr Zukang Sha
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