

ENVIROCITIES

eMagazine



مركز البيئة للمدن العربية
Environmental Center for Arab Towns

A Magazine for the Environmental Center for Arab Towns

Going Green For Sustainability



Our Message



H.E. Mr. Dawood Abdulrahman Al Hajiri
Director General of Dubai Municipality
President of the Environmental Center for Arab Towns

Protection of the environment issue from pollution and risks become of the most critical issues facing humanity, and when we look to the future, it is a very complex and sensitive in nature, as well it relates to our daily living and their direct impact on many of our lives. Therefore, the issue of environmental protection is a crucial public issue and should not leave to the Governments alone or for professionals only for consideration and addressed, everyone in the community is responsible and involved in preventing environmental harm, from his position or location as he could. We believe that the implementation of projects and eco-friendly initiatives in the frame and connected with urban development plans and strategic plans in city councils, is the key to the emergence of green cities. In our effort to practice the same and keeping with the times, the EnviroCities magazine is dedicated to be an online magazine only to raise environmental awareness and to enable maximum outreach in shortest time. Dubai Municipality believes in the importance of Environmental awareness and wants to define its role in environmental protection and conservation to achieve sustainability and real development as we are working, which makes Dubai an excellent city that provides the essence of success and comfort of living.

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“Energy Efficiency & Renewables: A Key Drivers for Clean Energy Transition for Green and Sustainable Cities”



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Many Arab countries have experienced rapid economic growth, in combination with rising populations. With these trends expected to continue, the region must prepare for intensifying energy demand in the decades ahead.

Currently, the Gulf countries face many challenges in the energy sector such as low energy efficiency, a high dependence on fuel subsidies and related high CO₂ emissions. On the other side, the region offers geographic and climatic advantages, including the world's greatest technical potential for solar power generation. In addition, some countries have good wind speeds for power generation and, in some cases, high potential for waste-to-energy and geothermal development.

To take advantage of these huge natural resources and opportunities, the GCC countries have initiated a smooth transition to a cleaner energy future, which targets a more sustainable, efficient and cost-effective methods for using energy.

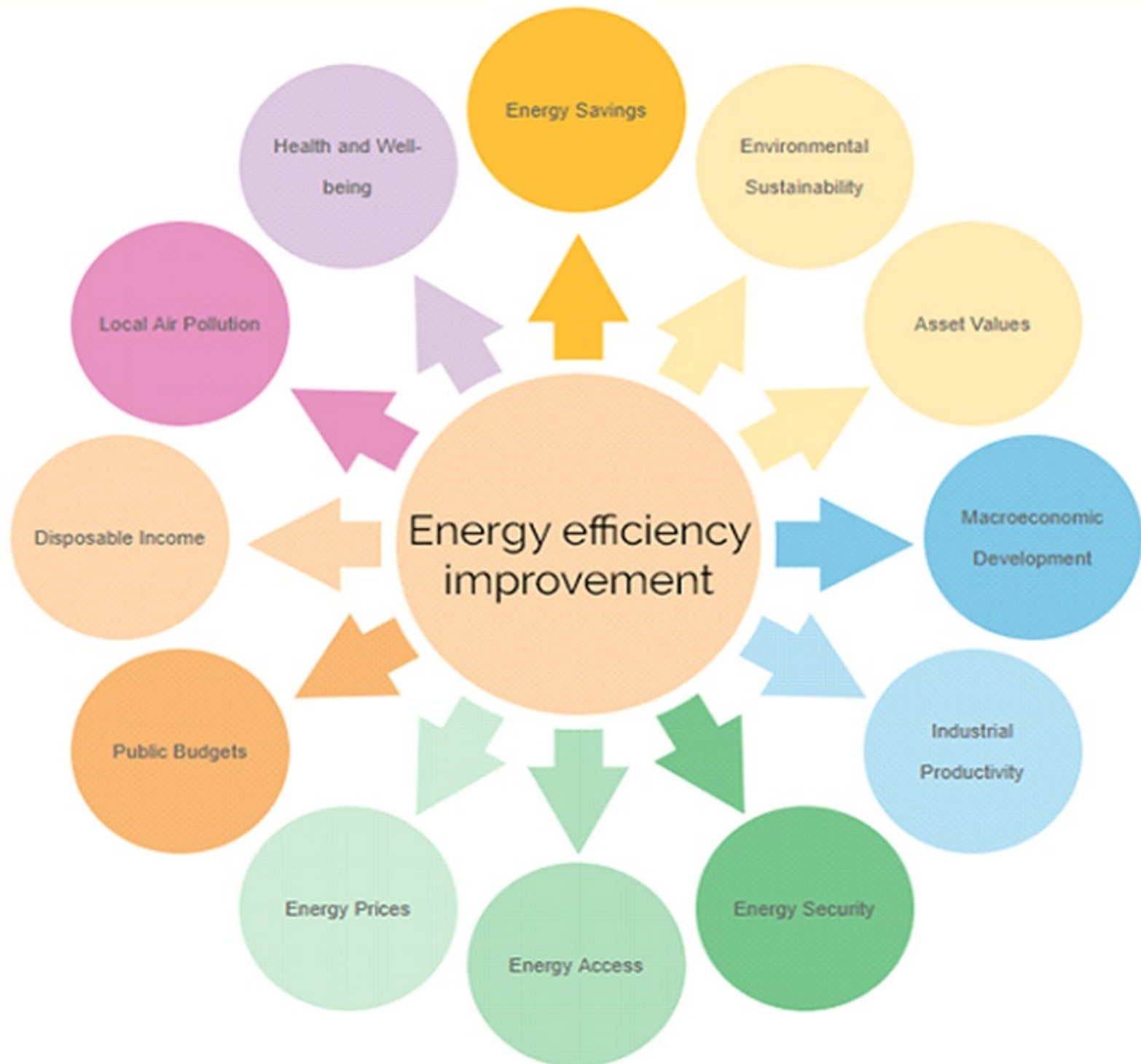
Energy Efficiency & Renewables key pillars for energy transition

Energy efficiency and renewable energy are the main pillars of the energy transition. Indeed, renewable energy and energy efficiency provide the optimal pathway to deliver the majority of the emission cuts needed at the necessary speed. Together they can provide over 90% of the energy-related CO₂ emission reductions that are required, using technologies that are safe, reliable, affordable and widely available.

Renewable energy sources could replace the oil or gas currently used for power generation. Along with averting a major source of carbon-dioxide emissions and reducing dependence on fossil fuels for basic needs, this transition to renewables in the power sector would make oil and gas surpluses available for more profitable downstream applications and export.

Renewables particularly solar energy is increasingly cost-effective for utilities, homeowners, business owners, and their communities. The falling price of solar systems results from improvements in the technology and economies of scale among manufacturers. On the other hand, because renewables systems can be installed in cities, towns and remote areas, it offers job possibilities for local engineers and technicians. Indeed, according to a recent IRENA's publication renewables energy technologies creates employment opportunities up and down the supply chain. Worldwide, the sector employed 11 million people at the end of 2018.

Energy efficiency measures and technologies, including smart technologies and smart cities, can play a major role to reduce energy intensity and thus emissions. There are solutions available suited for small, medium and large-scale applications and that can be implemented in different sectors of the economy such as building and Industry. In addition, energy efficiency provides significant co-benefits in terms of job/SMEs creation, revenue generation, interaction with research and innovation, increasing competitiveness and an improvement of companies' corporate images.



Benefits of energy efficiency, Source: IEA

The incorporation of climate change issues into the international political agenda in the 2000s brought energy and resource efficiency to the centre of the discussion on sustainable development and city sustainability. Discussions on urban forms including energy, resources efficiency and environmental performance became central elements in the search for new concepts and methods to define and measure City sustainability.

Green Cities have proven that they can make use of a wide range of clean energy sources technologies to supply energy for residential, commercial and municipal buildings. They have demonstrated interest in escalating these actions, which in turn may reduce costs, improve resilience, create jobs and contribute to energy efficiency and security

The C40 Cities Network: Leading by example approach

C40 connects more than 96 of the world's greatest cities to deliver the urgent and essential climate action needed to secure a sustainable, prosperous and healthy future for urban citizens worldwide. Representing 700 million people and one quarter of the global economy, mayors in the C40 network are, and have to be, committed to delivering on the most ambitious goals of the Paris Agreement. The bold climate actions that need to be delivered by mayors are increasingly clear. Emissions need to peak by 2020 and fall rapidly after that. Average per capita emissions across C40 member cities need to drop from the current level of 5.3 tonnes CO₂ per person to around 2.9 tonnes by 2030 and to zero by 2050. By setting the bar for all C40 cities to develop and implement a Paris Agreement compliant plan, C40 has pushed the ambition of the world's biggest and most influential cities. For example, London, Paris and Barcelona have increased the ambition of their climate action commitments to reach a full net zero carbon neutrality by 2050. The benefits of urgent climate action by cities increasingly clear. Those cities which make the sustainability transition fastest will also be the healthiest, wealthiest, most liveable cities of the future. Citizens and businesses will choose to live, work and operate in those cities that are protecting our climate and protecting their citizens. Ultimately, C40's efforts have been designed to help mayors realise the level of ambition to transform their cities into a more safe climate future.

However, achieving these objectives will require major policy decisions and infrastructure investments.

There are three main challenges in relation to the region achieving its clean energy targets:

- (1) political, legal, regulatory and institutional;
- (2) financial, market and economic; and
- (3) technological, infrastructure and human capacity-related gaps.

To improve cities' readiness to scale up clean energy share in their energy mix, it is recommended to start developing a priority action plan, which would aim to:

- ★ Develop and fund a comprehensive, holistic capacity-building programme covering the entire renewable energy & energy efficiency development life cycle, including planning, resource assessment, feasibility studies and implementation;
- ★ Explore untapped renewable energy potential, including heating and cooling, water desalination, biomass, geothermal, and storage opportunities;
- ★ Enhance spatial planning and administrative frameworks for clean energy deployment;
- ★ Create a favourable financial framework and mitigate investment risks for public and private sectors for accelerated clean energy deployment;

The Aachen Solar Tariff Model

In the early 1990s the city of Aachen (Aix-en-Chapelle) Germany set the first world feed in tariff scheme for solar energy. Until that time development of solar PV depended entirely on direct and substantial subsidies. Then in June 1993, Aachen's city council approved the first solar PV tariff that paid a profitable price for solar generated electricity.

Aachen calculated a tariff that would allow recovery of the "cost" of solar PV plus a modest profit called *kostendeckende vergütung* in German (literally a cost-covering remuneration). This principle is much like that used to determine the tariffs or electricity rates for regulated electric utilities.

The city did not base its tariff on the "value" of the solar electricity. This was--and is--revolutionary because solar PV is expensive and if rates are based on what it costs to install solar PV, the tariff will be much higher than that for other, cheaper, technologies. Aachen's city council took a bold move and said in effect, "we want solar and we're willing to pay what it takes".

Between 1994 and 1997, 30 Bavarian villages implemented a similar program.

Aachen and its sister cities established the principle of paying for the cost of generation for the generating technologies they desire-and not necessarily those that are the cheapest.

The Aachen model became the foundation for Germany's successful EEG, the Renewable Energy Sources Act (also known as the Act on Granting Priority to Renewable Energy).

Aachen's solar tariff and subsequent solar tariffs under Germany's EEG provided successful examples for others around the world



In addition, successful implementation of such action plan will depend on coordination among all organisations and stakeholders involved in promoting clean energy in cities including municipalities, regulatory agencies, local ministries etc, with clear mechanisms to avoid duplication of efforts among the key actors.

Dubai the greenest Sustainable City in the world? Why not...

As one of the fastest growing cities in the world, Dubai has understandably suffered the environmental consequences of mass oil production and a population that's constantly commuting by car.

Fortunately, authorities have been quick to react to these trends and the UAE now has an array of sustainable projects in place that are set to make Dubai the world's greenest city by 2020.

World's largest solar park

Dubai has found the perfect way to put its 3,500 plus hours of yearly sunshine to great use. The city will soon be home to a solar-powered plant the size supplying electricity to 800,000 properties by 2030. The world's largest solar park will improve Dubai's carbon footprint dramatically, reducing emissions by a whopping 6.5 million tonnes every year.

A new sustainable city model...

Having a city within a city (more than five million square feet) that's dedicated exclusively to sustainability acts as the perfect showpiece for Dubai's ambitious environmental strategy. Every part of Sustainable City will be dedicated to its residents' green and healthy lifestyle: a public orchard acting like a kind of nature's supermarket, solar panels on every home, a green buffer zone around the city perimeter to reduce noise pollution and improve air quality...



The Gulf cities could play a significant role in the regional and global clean and green energy market, which will be the cornerstone of the low-carbon green economy of the future.

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- www.c40.org/
- www.thesustainablecity.ae/

Dubai Green Mobility Strategy

Sustainable Transportation for Dubai's Sustainability Goals



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Energy strategies across the world focus on key levers driving local economies; energy security, efficiencies & sustainable growth are seen to be common denominators. Several countries around the world have realized the importance of developing a coherent, cohesive energy strategy to meet their future energy needs. For Dubai, its achievements are a natural result to the exemplary governance model of its energy sector. A model that is referred to as one of the few comprehensive demonstrations of streamlined energy sector management. This model stems from the Dubai Integrated Energy Strategy (DIES) 2030, which was launched in 2012 by the Dubai Supreme Council of Energy (DSCE), and is reviewed periodically. The DIES details a roadmap to achieve various targets by 2030, based on building a world-class regulatory framework to accelerate the diversification of the energy mix and facilitate effective demand side management. DIES which has recently been updated to reflect the timeline towards the year 2050 establishes a long term strategy outlook encompassing all elements of a coherent energy strategy.

DIES 2030 is aligned with the national and local vision making it an effective tool to meet the UAE Vision 2021 and Dubai Plan 2021 sustainable energy objectives.

Striving to become one of the most sustainable and smart cities in the world, the Emirate of Dubai has launched the Green Mobility Initiative to accelerate the uptake of hybrid and electric vehicles (EVs). The initiative complements the spirit of Dubai Plan 2021 by providing alternative modes of transportation that can save fuel and reduce carbon emissions. Given that road transportation is the third largest source of Dubai greenhouse gas (GHG) emissions, this initiative becomes an important contributor to Dubai Carbon Abatement Strategy 2021 which aims to reduce carbon emissions by 16% in 2021 compared to the business as usual (BAU) scenario.



In order to create the market for such vehicles, the Dubai Supreme Council of Energy (DSCE) and its entities followed a comprehensive approach that is founded on the principle of “leading by example” by government entities. A detailed analysis of market potential and size led to setting a penetration target of 10% of hybrid and EVs in government fleet and an Emirate-level target of 2% by 2021.

In addition to creating a market for hybrids and EVs, leading by example will enable the government to build the learning curve necessary to expand the deployment of such vehicles in the arid climate of Dubai. For example, hybrid vehicles were already proven to function successfully as demonstrated by the Road and Transportation Authority (RTA) of Dubai. RTA operates more than 1,200 hybrid taxis as of 2018, reporting about 25% fuel savings and no performance challenges. The RTA is currently planning to convert 50% of its fleet to hybrid taxis by 2021 and has 50 EVs in its fleet with another 100 EVs on order. It is also testing and monitoring feasibility of hydrogen cell vehicles based on recent advancement in this technology.

As the first-of-its-kind in the region, Dubai Green Mobility Initiative is part of a strategy to provide the infrastructure which shall promote hybrid and electrical vehicles in the Dubai. Dewa’s launch of electrical vehicle charging stations has set the motion for deploying such vehicles with 230 charging points throughout the Emirate.

To build the momentum for such crucial initiative an, Dubai introduced a directive to government entities where a percentage of their fleet can be gradually switched to hybrid and electrical vehicles. This approach was to create the demand for such vehicles and support the vehicle dealers.

The Dubai Supreme Council of Energy engaged with government entities and automobile dealers to increase penetration of these vehicles motivated by the enhanced performance of hybrid & electrical vehicles in recent years.

Subsequently, an incentive scheme has been introduced by Dubai government to support the penetration of hybrid and EVs among private vehicles owners by offering waiver of vehicle registration fee, allocation of designed public parking spaces and free charging. This government-led approach would embrace wider acceptance in the country to steer sustainable transportation and reduce carbon footprint.

Steady Steps to become a Role Model in Energy Management and Sustainability

The efforts of UAE and Dubai in spearheading clean energy development in the region contribute greatly beyond the borders of the UAE. In fact, Dubai's achievements directly relate to several United Nation Sustainable Development Goals, such as "providing affordable and clean energy", "industry innovation and infrastructure", "sustainable cities and communities" and "climate change". In a rapidly changing world, Dubai has seized the opportunity to follow a sustainable development pathway as it continues to grow. The clear and supportive vision of its leadership paved the way to develop a long term strategy and deliver phased but steady implementation progress to achieve its green agenda.

Developing the market for hybrid and electric vehicles encourages the use of environmentally friendly vehicles in Dubai with the potential to have a significant impact in reducing greenhouse gas emissions within the transport sector. Expanding the market for hybrid and electric vehicles will attract more electric and hybrid car manufacturers and encourage awareness in the community. The Green Mobility Initiative demonstrates a collaborative approach to create the market through a staged roll-out plan to achieve realistic targets and influence the transition to green mobility.

Sustainable Eco-Cities with a Smart Footprint



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Writer & Researcher



The dimensions of sustainable architecture are based on accommodating all the requirements of social groups and cooperation in the management of environmental issues and resources, to achieve a balance between three main foundations (economic development, environmental safety, and social welfare) through **regulating the relationship between the city and nature.**

The idea of sustainable cities, including neighborhoods¹ and streets, is summarized in meeting the cultural, political, environmental and social needs, as well as the economic and physical needs. It is a dynamic organization responsive to changes. It calls for multiple use of sustainable sources while maintaining open spaces. In order to promote a sense of belonging to the community and sense of place, and promote more intensive housing development.

It is a global trend adopted by the majority of nations through the Sustainable Development Goals Agenda 2030 through Goal (11), **“Make cities and human settlements inclusive, safe, resilient and sustainable”**.²

This is also what the Moroccan King Mohammed VI called for in his letter to the participants at the Cranes Montana Forum; **{today, the world is required to create development patterns that will ensure the well-being of our peoples while maintaining the conditions for its sustainability. Let us all work together in this direction, and listen to the innovators and young people who constantly renew and prepare tomorrow's world for us. It is the responsibility of the States to embrace future visions and to achieve them on the ground,... but the public policies, however ambitious, remain fragile unless owned by the population and by civil society organizations...This is the true meaning of sustainable development. For development to be durable, strong and rich, it must be based on a vision shared by all actors of society, so that each party decides and chooses to achieve it in its own way}**.³



Historically, this idea has been proposed and discussed since 1996 by the economist, Kenneth Boulding. He sought to invite us to begin to think of our planet as a spacecraft. A closed system with finite sources that have nothing but solar energy that gives life to plants and gives oxygen. Today, the sun is the source of energy that produces wind, rain and renewable energy that can be consumed without polluting the environment. In the same trend, urban economist Herbert Girardet, noted that the key is that consumption in cities reduces the effectiveness of resource reuse. Materials should be reused, waste be minimized, energy be depleted, renewable energy be reduced, and environmental impacts be minimized. The essence of all this is to create the smallest ecological footprint possible in cities to be able to sustain themselves with little reliance on the surrounding rural areas. The city strengthens itself to efficiently use land, recycling or converting waste into renewable energy sources and produce the least amount of pollution possible within the framework of so-called spatial development.

Therefore, we find that protecting nature to meet challenges and improve people's lives is essential in sustainable urban planning. For example, by allocating areas for cultivation within neighborhoods, residents and visitors will receive immediate purification of the surrounding air. Raising the positive factor in the psychology of the citizen. Creating green areas for pet breeding, as well as social, cultural, spiritual and religious benefits on the psychological and aesthetic climate of Human, even more, there are possibilities of creating new jobs or so-called green jobs. Taking advantage of the technology needed to manage the infrastructure, to ensure the efficiency of the work of all events of the city.

1. Spatial development in the service of the urban view and improve the attractiveness of cities

As a well-known, spatial development forms point of convergence of sectorial policies in the context of a holistic view aimed at reducing regional inequality. Also, highlighting the developmental qualifications to produce new wealth and providing employment. Additionally, it is the best way to reconcile economic efficiency with social justice while preserving the environment.

In this context, as a typical example, Morocco is one of the countries that have adopted this approach. Morocco has intended to make the entity taken the leading position in the representation of the central administration at the territorial level, as the regional level represents the appropriate framework for the coherence and eclecticism of public policies and programs of various sectors. Therefore, the regional design of soil preparation is the reference document for the spatial configuration of the total territorial soil. It aims, in particular, to achieve consensus between the State and the Authority on measures to create and qualify the field in accordance with a strategic and forward-looking vision, the directions and choices of regional development, through:

- ★ Developing the general framework for sustainable regional development in urban and rural areas.
- ★ Identifying options for the equipment, structured public facilities and facilities at the entity level.
- ★ Identifying the areas of regional projects and programming their valuation procedures as well as their structured projects.

In line with this trend, urban rehabilitation and economic and social development programs are part of major workshops aimed at improving the urban view and the attractiveness of cities, through upgrading infrastructure and rehabilitation of public facilities and equipment, among others.

Most cities and urban centers have developed rehabilitation programs in order to increase the attractiveness of cities, improve the living environment of the population and strengthen the infrastructure. As well as the rehabilitation of equipment and facilities within a holistic vision, which integrates field, economic and social dimensions. In general, a number of Moroccan cities have benefited from these programs at varying rates depending on the population, the quality of the proposed projects and the amount of funding allocated. These development programs, which have been implemented in accordance with this participatory approach, have for years focused on the most important sectors (examples only):

- ★ Restructuring of under-equipped neighborhoods: in order to provide the urgent needs of the population, such as road networks, green areas and proximity facilities, etc.
- ★ Remediation of ramshackle buildings.
- ★ Mainstreaming Zero Emission Buildings. This is in line with the eco-cities requirements with a high level of low-carbon energy efficiency.

Commitment to sustainable architecture encompasses all phases of construction, including planning and construction, and restructuring based on good planning, which is forming a driving force and a source of development with the potential to improve and change the lives of billions of people if managed well. Thus, cities become engines of national economic growth, social prosperity and environmental sustainability.

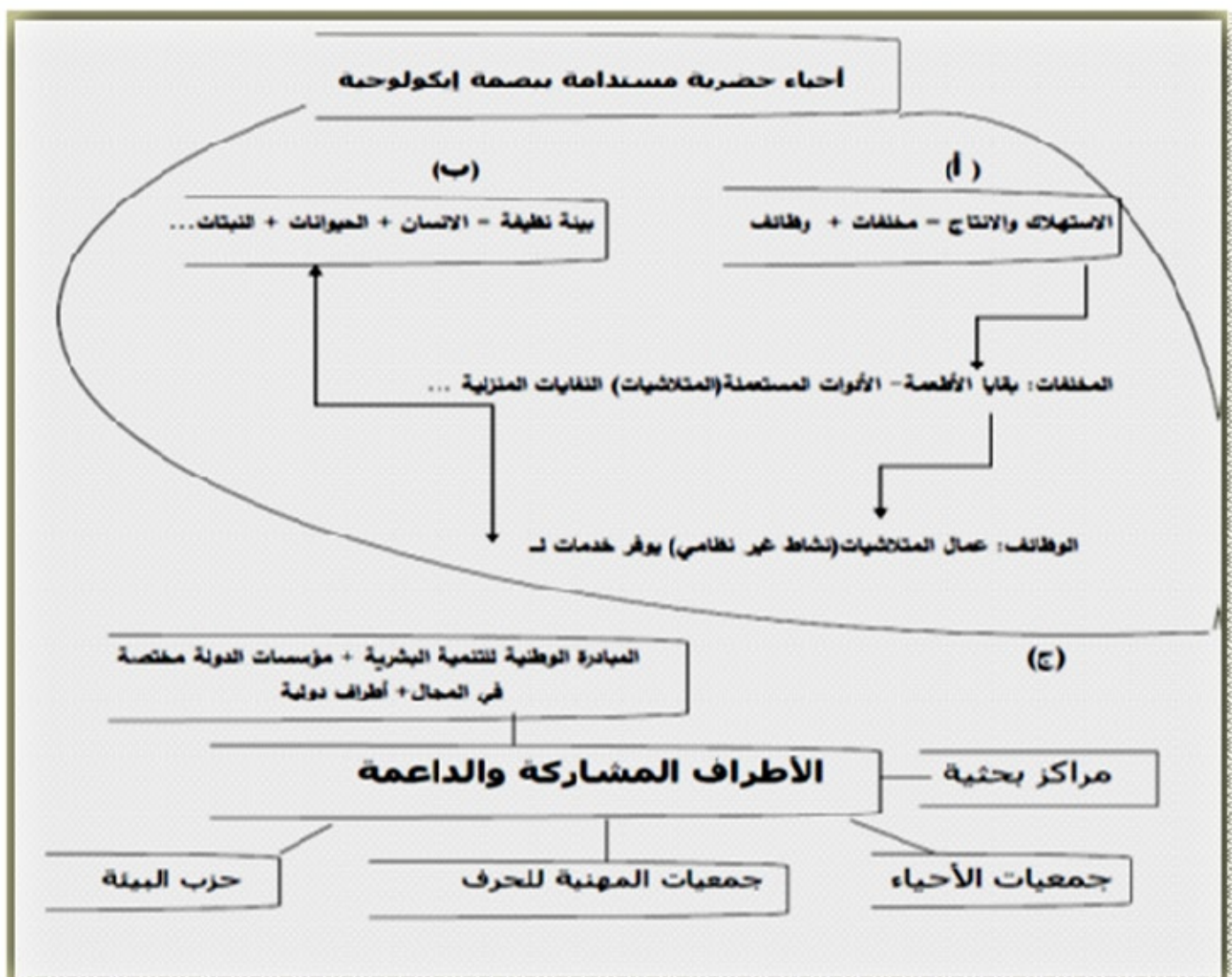
2- Specifications of sustainable urban neighborhoods from a Fan Foundation's perspective:

The idea of sustainable urban neighborhoods is based on the creation of neighborhoods free from fear, violence and disease. Where all forms of life thrive, they aspire to neighborhoods linked to the place where the vitality and unity of the neighborhood is born, within the existing realistic city, rather than proposing a radical vision of new construction.

The Moroccan Fan Foundation has intended for this program. It is originally a voluntary work, where a group of researchers and environmental activists in cooperation with the Al-Manara Center for Studies and Research to outline the project within the Foundation's programs.

It stems from the rule that **"between production and consumption, there are opportunities for development"**. Our neighborhoods are changing and complex template of human activities, need a great understanding of the relationship between people, services, policies and products. They are also eco-economic systems. Therefore, we must work towards a balance between the environment, the economy and social values so that these new places can meet the work and life needs of the local population and their interests and breathe life into important jobs and their impact on income and the environment.

According to the idea of the program adopted by the Foundation in the name of **"Sustainable Urban Neighborhoods with Ecological and Healthy Footprint"**, as shown in the diagram below



Aiming primarily through it as per its Statute to; integrating environmental into the spatial planning of neighborhoods, which will increase opportunities for economic development, through a system of recycling of waste collected.

This point is linked to the possibility of implementation at the district level, for example, the exchange of goods informally, or re-use of the residues of restaurants and meat and fish vendors by making these residues of food eaters of animals and also fertilizers for urban agriculture. In this way, we stand in front of an informal activity (scavengers) that provides jobs classified as green, in an attempt to integrate this category into the economic cycle through the process of sorting, reclaiming and selling waste to the owners of manufacturing enterprises. As part of the initiative, which falls within the framework of the project on the optimal waste management in the Mediterranean basin, which is part of the European program entitled "**The City**" ... Hoping to take steps towards energy valuation of waste to become a source of renewable energy. I.e. **anaerobic digestion** (energy generation from urban waste, where organic waste is analyzed in the absence of oxygen, resulting in methane-rich biogas suitable for energy production) can provide a fundamental solution to aggravated waste issues while at the same time reducing energy requirements .)

Accordingly, it reaches the level of utilization of urban waste to produce biogas as sustainable energy, thereby reducing the demand for landfills, along with a useful by-product of gas derivatives that can be used as fertilizer.

Indeed, we are at a critical juncture for the future of urbanization, because of the inadequate urban planning and the sterility of governance can lead to significant economic, social and environmental costs that threaten the sustainability of urban development. Therefore, urban and institutional frameworks, as well as policy, legislative and regulatory frameworks still need to develop a participatory framework to address the challenges of rapid urbanization, population growth, climate change and disaster risk. In addition, ensuring the participation of key stakeholders is essential to ensure at the grass-roots level support to implement the policies formulated, which must take place within the broader context of sustainable urban development.



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On the Road to Sustainability: Taking the Circular Economy Autobahn



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1. The origins

Contrary to reality, we, the ‘wise man’—or *Homo sapiens*, have always taken an anthropocentric¹ stand in everything we did so far. By reasonable judgement, this will be the norm at large in the next couple of decades as well. Taming nature and extraction/consumption of ever-increasing quantities of resources have been fundamental to all progressive civilisations thus far. It is also fundamental to the current model of economic growth and development we follow to the hilt. Consequently, severe environmental degradation and depletion of resources have occurred in tandem. Adding insult to injury, globalisation and population growth coupled with the fallacious chase on GDP growth have aggravated this situation further.

However, since the mid 20th Century, the *manmade* environmental calamities such as the Great Smog of '52, the threat of DDT in the 60's, Ozone depletion of the 70's, and the minor and unremarkable to the largest ever oil spill in human history—the Arabian Gulf oil spill in '91 drew attention of humanity to the underlying issues prompting a sluggish, nevertheless, a shift in this anthropocentric order of business toward an eco-centric direction.

The extensive consumption of fossil resources along with the applications of synthetic chemistry/biology—which are also liberally attributed to the aforesaid calamities—has triggered a frenzy of industrial and economic development (see Figure 1: GDP as a proxy indicator), as a result increasing the environmental footprint of humanity as never seen before. Intensive pollution—land, air, and water—was widely recognised as a symptom of the underlying societal metabolic disorder, which gave impetus to the global green movement in the 20th Century. Adding momentum, the contemporary debate on Global Climate Change attributed to anthropogenic global warming has accelerated the pace of application of green [environmental] solutions globally in the last decades.

¹The view/belief that human beings are the most important entity in the Universe.

One may find Kopnina et alii' (2018) analysis useful for some insights and perspective. See: Kopnina, H., Washington, H., Taylor, B. et al. *J Agric Environ Ethics* (2018) 31: 109. <https://doi.org/10.1007/s10806-018-9711-1>

World GDP over the last two millennia

Total output of the world economy; adjusted for inflation and expressed in international-\$ in 2011 prices.

Our World
in Data



Source: World GDP - Our World In Data based on World Bank & Maddison (2017)

OurWorldInData.org/economic-growth • CC BY

Figure 1 | World GDP growth

2. The spectrum of approaches: *id Est, all roads lead to Rome!*

The constant bombardment of news on environmental distresses, resource scarcities, social inequalities, economic downturn, etc. remind us that the humanity is facing an existential threat, for which, achieving sustainability has been projected as the cure-all. Therefore, achieving environmental, social, and economic sustainability—popularly termed: *triple-bottom-line sustainability*—had been set as the target destination of humanity in the current century, thus, the global endeavour on Sustainable Development Goals [SDGs] in the short-term.

Achieving social and intergenerational equity, resource extraction and consumption adhering to the planetary boundaries² and, at the same time, achieving economic growth and prosperity³ while minimising the negative environmental consequences largely form the matrix of SDGs.

Though the exact origin of greening for sustainability is somewhat nebulous, it has been there for a while now which presents a broad array of solutions for the aforementioned socio-economic and environmental concerns. These solutions include, green products (e.g. green chemicals) and services (e.g. green IT, green design, and green certification), green infrastructure (e.g. green buildings), green energy (e.g. carbon neutral/renewable energy), green processes (e.g. green manufacturing, green chemistry), green policies (e.g. green public procurement), etc. those that aim to establish green jobs and green cities with the ultimate aim of reaching green economies where sustainability is fundamental.

²One may peruse: <https://www.stockholmresilience.org/research/planetary-boundaries.html> for further on the subject of planetary boundaries.

³The underlying approach is popularly known as *decoupling*, either absolute or relative.

For further insights; Jackson, T. (2009). *Prosperity without Growth: economics for a finite planet*. London, UK: Earthscan.

Though oftentimes presented as a subset of the green economy [GE]; bio-economy [BE] and circular economy [CE] are two other alternative routes to sustainability, which the concepts are mostly observed to be deployed in high-income economies.

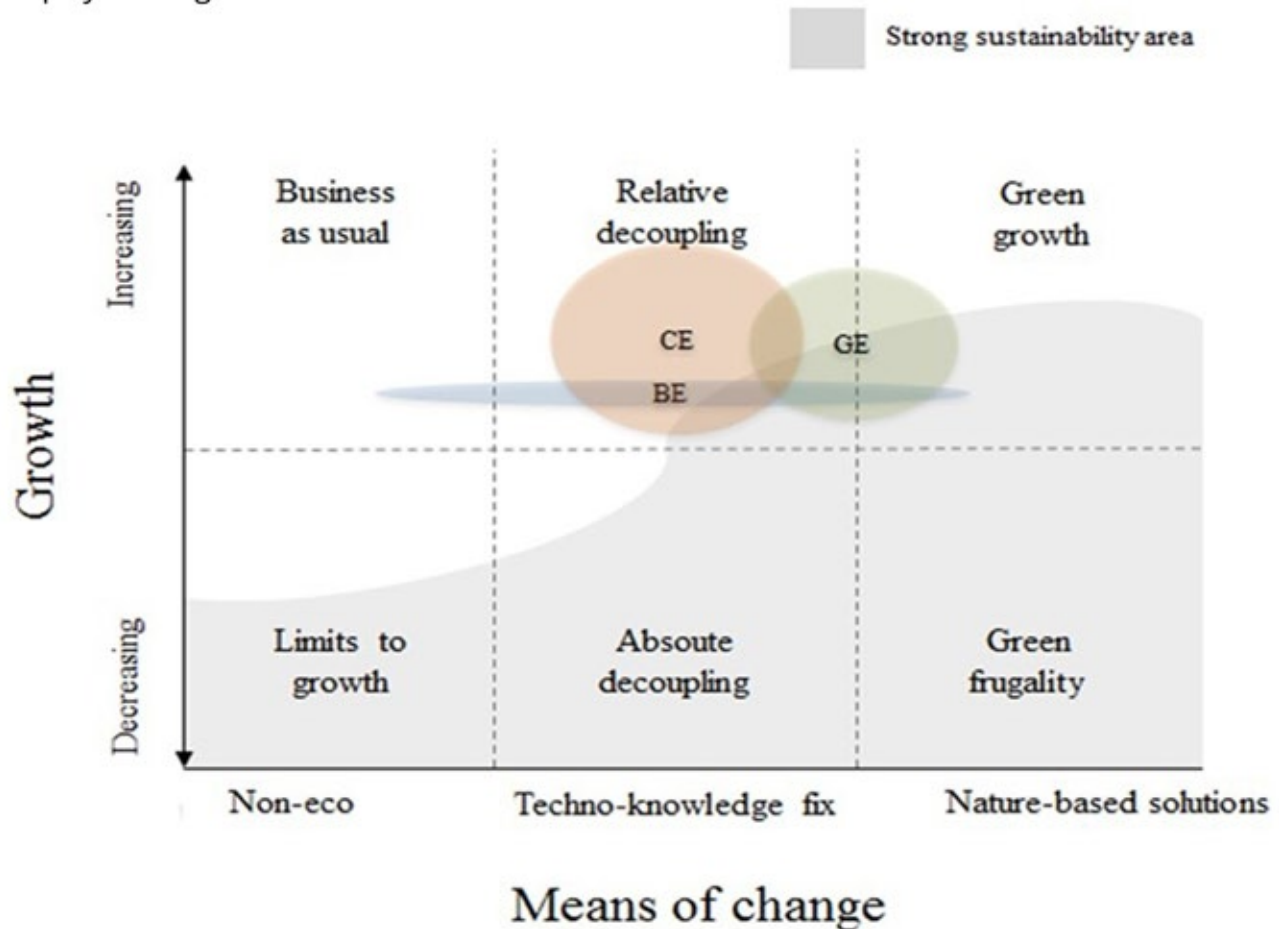


Figure 2 | Relative position and association of GE, BE, and CE

NOTE: Figure 2 intends to highlight the close association and relative position of the three concepts. The size of the bubbles does not pertain to the current work. As cited and adopted by D'Amato et al., (2017) from Franceschini and Pansera (2015).

3. Circular Economy: a road less travelled

As widely acclaimed, CE is an alternative route to full on sustainability, albeit, still at its early adoption phase. Developed emulating the energy and material flow management model in biological systems, CE is positioned as an alternative to “the current take-make-waste extractive industrial model. [a] CE aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital”⁴.

⁴<https://www.ellenmacarthurfoundation.org/circular-economy/concept>

⁵Elia, V., Gonin, M.G., Tornese, F., 2017. Measuring circular economy strategies through index methods: a critical analysis. *J. Clean Prod.* 142, 2741-2751. <https://doi.org/10.1016/j.jclepro.2016.10.196>

⁶EEA, 2016. Circular Economy in Europe – Developing the knowledge Base: Report II. European Environment Agency. <https://doi.org/10.2800/51444>

⁷Adapted from Ralph Waldo Emerson' (1803-1882) famous quote

⁸Schroeder, P., Anggraeni, K., Weber, U., 2019. The Relevance of Circular Economy Practices to the Sustainable Development Goals. *J. Industrial Ecology.* 23-1, 77-95. <https://doi.org/10.1111/jiec.12732>

As hinted earlier, according to Elia and others (2017)⁵ and the European Environmental Agency (2016)⁶, CE is characterised by its ability to: reduce input and use of natural resources; reduce emission levels; reduce valuable material losses; increase share of renewable and recyclable resources; and increase the durability of products, whereas CE is based upon three simple principles, namely, a.) design out waste and pollution, b.) keep material and products in use as long as possible and as economically as possible, and c.) regenerate natural systems.

There is an simple amount of symptoms indicating that Earth's complex system is in a critical state. Therefore, an immediate course correction is well in order. Despite CE's relative novelty, its unambiguous and praxis-oriented nature is seen as a *positive* in deploying action toward achieving sustainability at local, national and international levels. CE, perhaps, is a road less travelled as yet. But, by analogy with German *Autobahn*, CE is a clear, straight, and obstacle-free, high-speed freeway to sustainability.

4. "It's not about the destination, but the journey"⁷

As exemplified in many domains in the European Union—the predominant employer of CE at present, CE is not just another fancy complexity for waste management. CE helps reduce virgin resource extraction/input to the economic processes while also reducing the associated environmental impacts. As opposed to other economic models, CE's utility is evidenced in tangible deployments in the EU. Accordingly, a recent estimation suggests that *"CE practices such as chemical leasing, nutrient recovery in agriculture, materials substitution in construction sector, and shared ownership models in transport systems could reduce up to 7.5 billion tonnes of CO_{2-e}, globally. This would bridge half of the existing emissions gap to reach the 1.5 °C target as outlined under the Paris Agreement"*⁸.

While being true to form, CE creates innovative business models. That also means, besides generating profits, CE creates employment opportunities, therefore, among others, directly augment the social sustainability targets (see Schroeder et al., (2019) for some insights). On the economic aspects, according to Ellen MacArthur Foundation (2015), a CE shift would reduce, by 2030, the net expenditure on resources by 600 billion Euro/annum, improve resource productivity by 3%, and generate 1.8 trillion Euro/annum of net benefits in the EU⁹.

5. CE and the yonder

Owing to its origins, the CE model's applicability seems universal. Evidently, CE has an unparalleled potential to fix the societal metabolic disorder the modern civilisation is suffering from. Its versatility in resolving developmental and environmental challenges simultaneously is also given due consideration in promoting CE as an effective tool in achieving SDGs¹⁰. Given the forecasted severity of impending resource and environmental crises (see Figure 3 for some insights)¹¹ CE seems like one of the best alternative paths to tread.

According to the latest assessment by OECD (2019), the "global primary material use, and thus *"global primary material extraction, is projected to double in the coming decades [...]—from 79 Gt in 2011 to 167 Gt in 2060"* (see Figure 4) . In the same assessment, it is predicted that the material intensity of economies—in particular in OECD countries—set to decline and also the recycling sector's growth, therefore the secondary materials use, will surpass the mining sectors growth as recycling is becoming more price competitive than mining. This is in part attributed to the strong presence and growth of CE. However, highlighting the European Academies' Advisory Council (2015), Schroeder et al., (2019) points out that transforming the current linear economic model to CE is stymied by *"a skills gap in the workforce and lack of CE programmes at all levels of education"*.

⁹Ellen MacArthur Foundation. 2015. *Delivering the circular economy: A toolkit for policymakers*. Cowes, UK: Ellen MacArthur Foundation.

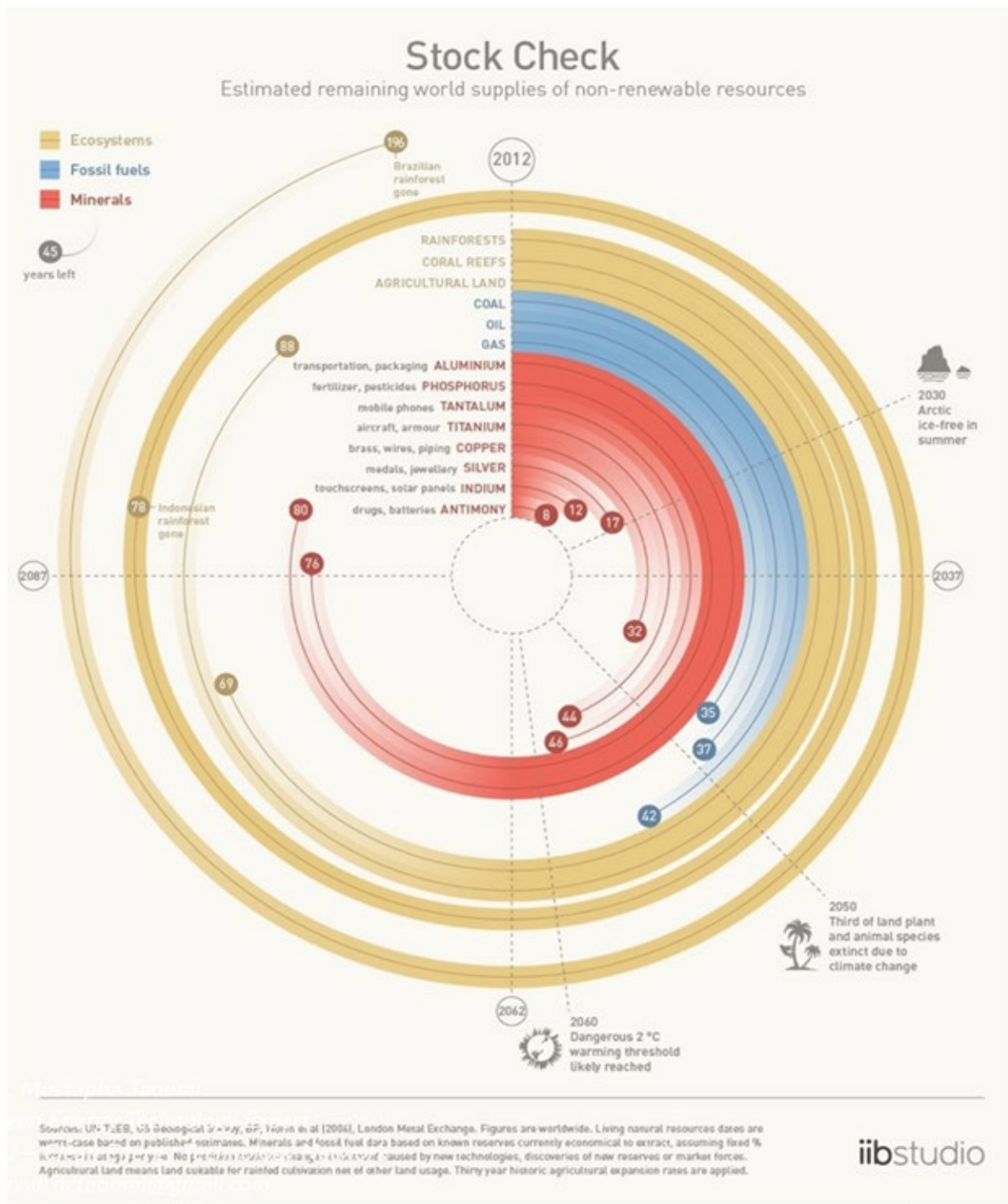


Figure 3 | Remaining non-renewable stock of resources

To that end, the efforts of Europe's premier research and higher education institutions such as the Institute for Applied Material Flow Management [IfaS] of the Trier University of Applied Sciences¹³, Germany are highly regarded locally and internationally by industries, academia, and the public sectors alike. For nearly two decades IfaS has deployed its expertise in CE on practical projects on five continents, offers graduate and postgraduate level education on CE through dedicated degree programmes¹⁴, and continually disseminates applied knowledge on CE through its signature events platform; International Circular Economy Week & Conference¹⁵.

¹⁰See Schroeder et al., (2019) for some in depth insights on this aspect

¹¹Source of image: BBC Future: <http://www.bbc.com/future/story/20120618-global-resources-stock-check>

¹²Note: indicates the net effect of the three trends.

OECD (2019), Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences, OECD Publishing, Paris, <https://doi.org/10.1787/9789264307452-en>.

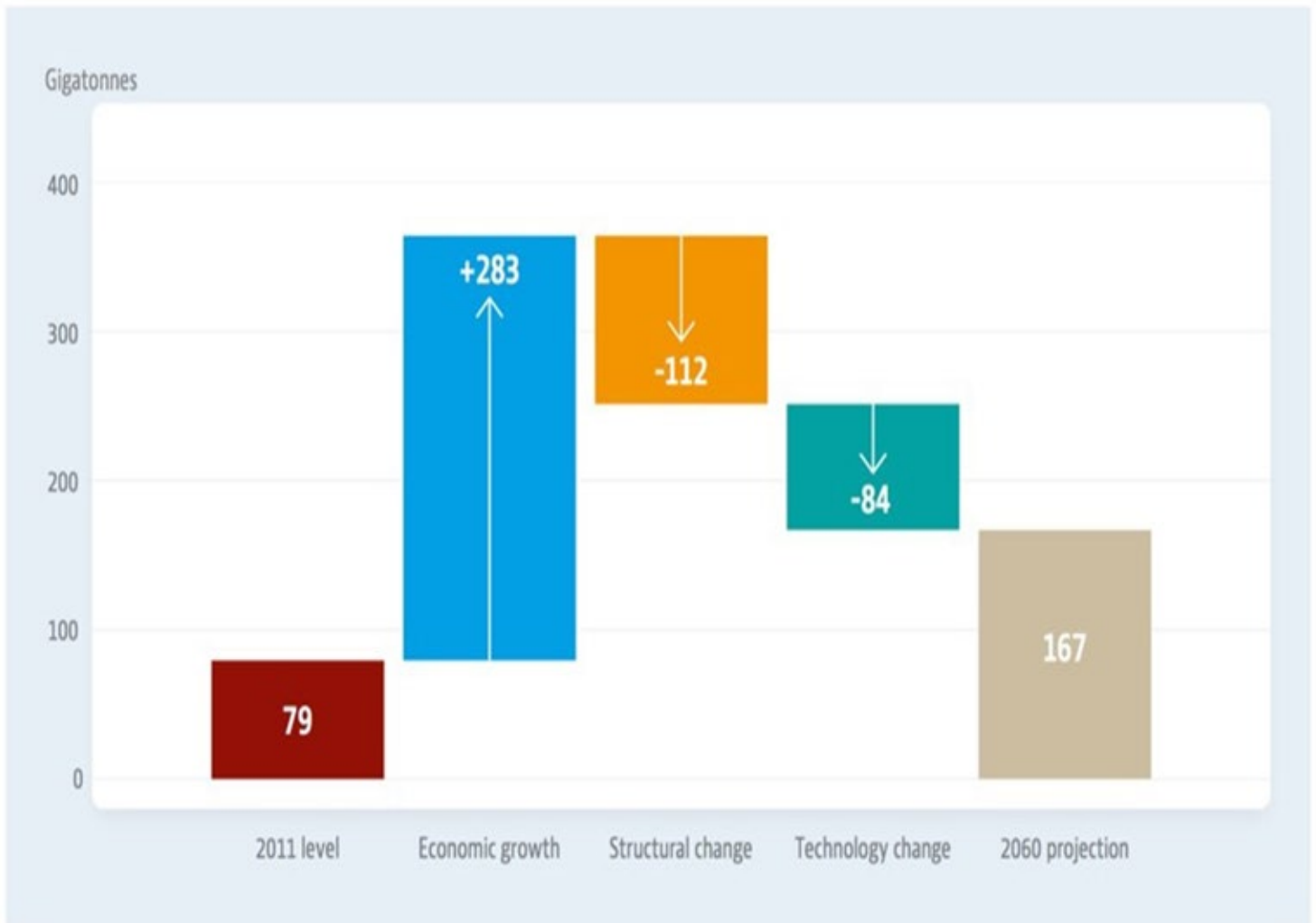


Figure 4 | Forecast on global material use

In conclusion, we would say that the future is not all doom and gloom. Sustainability is not a hypothesis, but a practical reality achievable even within the current capabilities. However, it is a matter of treading the correct path at the right pace. Therefore, we encourage you, the keenly enthusiastic, environmentally savvy, and sustainably oriented reader, to chart your new course, take the CE Autobahn to sustainability and be a part of the global force that will truly save the future of humanity on this blue planet. That is the only way to leave your legacy, so, have a go at it. Godspeed!

¹³Find out more at: <https://www.umwelt-campus.de/ucb/index.php?id=home&L=1> and <http://www.stoffstrom.org/en/>

¹⁴<https://www.imat-master.com>

¹⁵<https://icew.de>

Developing Small Cities as a Strategy for National Urban Sustainability



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Abstract

It is historically known that some particular cities dominate power and growth while other smaller cities get much less growth opportunities and it became a tradition. This tradition has continued into the present time in large number of countries causing many challenges to smaller cities to have proper urban development and the national development sustainability. Sustainable urban national development will require adapting policies and strategies to create balanced urban fabric between the large and small cities. However, there are many challenges to achieve such goal particularly economic and political. There are large differences between countries about this issue. Norway is one of the countries, which has applied different strategies to deal with this problem.

History

Since earliest civilizations, main cities had provided containers to concentrate power and to attract all human and resources to keep their dominance.

The most important technological achievements in early history were done by communities in Tigris valley and included all important components of establishing a city community including rules, agriculture, building construction, and transportation. Parallel improvements were made in irrigation. The community required a ruling power to run, secure and maintain the community and its growth. All these factors had played important roles to create power struggle between main cities about resources and dominating territories. Therefore, big cities were always center of wealth and power which demanded more population to achieve this role and gave people more opportunity to work and survive. This condition had also contributed to make smaller cities unable to grow in same way as the large cities and in many cases, they were simply deserted. But developing of small cities is not limited to building and architecture but much more comprehensive¹.

We can witness that all countries in the present have large cities where development is concentrated with large growth speed while there are smaller cities in the same country suffer from different urban and development problems. This issue is not a problem of particular countries or particular regions, but it is a global phenomenon.

Different governments have developed various strategies to what is called regional or national development. But despite their efforts the large cities are still dominating the growth. We can mention here countries such as Istanbul, Ankara, Izmir in Turkey, Cairo and Alexandria in Egypt. New Delhi in India, Chinghai and Guangzhou in China, and Tokyo in Japan. In USA majority of the population lives in main cities in east. Paris, London, Rome, Copenhagen, Stockholm and Madrid are examples of European cities where they dominate their countries.

Developing Small Cities Case of Norway

Many countries have developed strategies to support growing their small cities, towns and rural communitiesⁱⁱ.

Among important strategies to develop small cities are decentralization, developing efficient transportation network between cities in general and between small cities and large cities, develop small cities housing, amenities and economy.

In Norway, the gap between large cities and small cities are increasingly becoming visible due to concentrating the development in the main cities.



Norway's largest city Oslo



A typical small Norwegian city Moss

To deal with the problem, the Norwegian authorities have applied many of strategies such asⁱⁱⁱ:

Reorganizing university systems in the country. Universities which were located in main cities such as Oslo, Bergen and Trondheim have been decentralized by merging colleges of the small cities into the exiting universities. This step has strengthened the education systems in these colleges and have provided the small cities with better options to attract students and jobs.

The other strategy is **bringing mobility** and transport more in line with sustainability. It is imperative for a sustainable city to reduce end-forced mobility and stop promoting and supporting the unnecessary use of motorized vehicles. It gives priority to ecologically sound means of transport (in particular walking, cycling, public transport) and make a combination of these means the center of cities planning efforts. Motorized individual means of urban transport ought to have the subsidiary function of facilitating access to local services and maintaining the economic activity of the city

Developing sustainable economy is a key issue in any development. It depends on investing in natural resources such as water, forest, soil, wind, and atmosphere. The target is to have a **natural sustainable capital**. To achieve this, small cities adapt various methods such as conserving natural resources, increasing the end-use efficiency of products, such as energy efficient buildings. Using local natural resources to produce energy from water and wind is widely used in small cities. This will also include **Developing local industry and local business** it includes supporting local industries and business by encouraging their integration in local, regional, national and international marketing networks.

Local Self-Governance, Norway has applied several additional decisions to support local self-governance as a mean to the strengthen small cities knowledge and creativity to develop sustainable ways of living and to design and manage these cities towards sustainability.

The democratically elected representatives of the local communities play continuous active role to take responsibility for the task of re-organizing cities and towns for sustainability. But achieving this goal depends on small cities real power and how solid is their financial base.

Social democracy is one of the main pillars in the Norwegian system. This system is used to support small cities. Social Equity for Urban Sustainability

Inequitable distribution of wealth both causes unsustainable behavior and makes it harder to change. Norwegian system has integrated people's basic social needs as well as healthcare, employment and housing programs with environmental protection. In this system, the target is mainly supporting sustainable lifestyles, to improve the quality of citizens' lifestyles rather than simply maximizing consumption.

This includes several sub-strategies such as creating jobs which contribute to the sustainability of the community and thereby reduce unemployment. This includes support creating sustainable business opportunities to encourage the creation of long-term jobs and long-life products in accordance with the principles of sustainability.

Urban development is a key strategy which is strongly adopted by small cities. One of the common conditions of small cities is deteriorating its urban fabric in general compared with large cities. It includes city's architecture, urban design and landscape. Big cities always are known for their architecture but small cities have not such possibility. The result is not only creating unbalanced development condition between the large and small cities but also influencing city life, population growth, economic growth, social life and social development. Young generations are always seeking after job opportunities and big city life.

Therefore, the new trend of Norwegian small cities of developing cities urban fabric is aiming to achieve a balance urban fabric between large and small cities. It includes establishing special department or unit within each municipality to develop guidelines, strategies, plans, projects which can realize this target. These departments work as key initiators and collaborators for different urban projects in these cities which consider sustainability and growth of small cities in sectors of housing, amenities, transportation, urban health, and economy^{iv}.

Although Norway has applied many of these strategies since 1990s, yet the main target is far from being achieved. Continuing with applying and updating the different strategies are important to achieve the targets.

Conclusion

Developing small cities is one of the important strategies to achieve sustainable development in any country. But this will demand several interrelated strategies to achieve the optimal result. The case of Norway shows active application of these strategies which are providing these small cities with better conditions to correct their growth path. But the target is far from being achieved and the gap is still there although, the situation is improved. Therefore, other countries which have this problem and do not apply any strategy to deal with the problem will get larger problems and will need larger resources to solve.

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Faith for Earth: An Innovative Approach to Achieving the Global Agenda 2030 and the Sustainable Development Goals



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Religions and Sustainable Development:

The global Agenda 2030 can only be achieved by engaging stakeholders, mobilizing partnerships and engaging untapped innovative approaches. While it is widely acknowledged that the role of civil society and non-government organization is crucial, the full spectrum of such organizations has not been adequately addressed including those organizations based on faith, values, culture and indigenous knowledge. Traditional stakeholder's engagement strategies requiring new creative, inspiring and innovative actions bringing like-minded networks to support the implementation of the Global Agenda at all levels.

Spiritual values for more than 80% of the people living on earth have been driving individual behaviors. In many countries, spiritual beliefs and religion are the main drivers for cultural values, social inclusion, political engagement, and economic prosperity. Conserving the environment has not been absent from the focus of faith-based organizations.

The UN system has recognized Faith-Based Organizations as key and essential players in eradicating poverty, improving people's health, protecting the environment and thus achieving sustainable development. UN Environment Programme has been working on facilitating the integration of religious and cultural values to ensure an inclusive green and transformative development through adopting lifestyles that are informed by faith-based values and behaviors to achieve sustainable consumption and production.

Faith for Earth

UN Environment Programme has launched a global initiative "Faith for Earth" to strategically engage with faith-based organizations with a mission to "Encourage, Empower and Engage with Faith-Based Organizations as partners, at all levels, toward achieving the Sustainable Development Goals and fulfilling Agenda 2030." To be

able to do so, the organization has been engaging with faith-based organizations to realize an impact on local communities' sustainable livelihoods based on universal spiritual values. The Strategy focuses on mobilizing faith-based investments in supporting SDGs' implementation while greening their assets and providing the needed knowledge for effective messages of faith leaders with decision makers and the public. The aim of the initiative is to work with faith leaders, faith investment institutions and create linkages with scientific evidence.

The religious teachings cover a wide range of topics from food to clothes, from leisure activities to working relationships, from finance to education, and so on. The orientations on lifestyles contained in faiths' principles are also characterized by their overall aspect, referring to all aspects of life.

All faiths and religions consider the environment and its resources as sacred and religious scripts do emphasize people's responsibility to utilize these resources with care and with next generations in mind. However, faiths tend to rely on their own teachings without creating an interfaith dialogue or exchange of knowledge to strengthen their global outreach, therefore, there is little interfaith partnership and lack of interfaith communication, collaboration, and interaction. Furthermore, to be affective, these organizations need to be present at global environmental conventions and conferences to engage in dialogue with policy makers on the moral, ethical and religious obligations to protect the environment and implementing the SDGs.

Environment has launched a variety of programmes and initiatives at the global, regional and local levels. Initiatives like the 10-year framework on sustainable consumption and production, sustainable lifestyles, the poverty-environment initiative, the protection of marine environment, the finance initiative, and many others depend on partnerships with stakeholders for either delivery of the services, or advocacy for impact. Thus, faith-based organizations could be excellent partners when they are encouraged, empowered and engaged toward achieving common objectives.

Faith-based Investment

While faith-based investment corporations and bodies are the fourth global largest among investors, there is lack of interest or the necessary knowledge among faith-based financial institutions to invest in environmentally responsible projects. Such organizations mainly depend on the "no sins" criteria for investment and not the sustainable impact of their investments. Such absence of positive impact that FBOs can bring misses on the potential to influence the legal structure for investment on environmental protection.

Religious investments may be governed by beliefs and religious laws. Islamic financial institutions, for example, ban interest on investment and use the Sharia law of finance including Mudaraba (Profit and loss sharing), Wadiah (safekeeping), Musharaka (joint venture), Murabaha (cost plus), and Ijar (leasing). The Islamic financial system places equal emphasis on the ethical, moral, social and religious dimensions, to enhance equality and fairness for the good of society as a whole.

The sums of money involved are not small: in the USA alone, religion constituted in the year 2000 around 32% of all giving amounted to \$335 billion. On the other hand, the Islamic Financial Services Board (IFSB) has been able to sustain its total assets value at approximately USD1.9 trillion in 2016. Private faith-based investments are rising, particularly in developing countries.

Faith-based organizations have been instrumental in moving the impact investment agenda forward, and spearheaded the movement decades ago. Some faith-based organizations have also adopted policies to encourage corporate social responsibility practices by those using their investments incorporating environmental and social services and even human-rights based programmes as in the case of Christian investors.

Faith for Earth will work with faith-based organizations and faith-based funds to strengthen the environment and sustainable development components of their activities. The social impact investment principles will be strengthened to include principles of stewardship and duty of care for the creation. This will not only target projected investments, but also existing faith-based assets and establishments. UN Environment will work with faith-based organizations to green their assets and practices. It is estimated that there are 37 million churches and around 3.6 million mosques around the world. These houses of worship can be models for the local communities and at the global level as institutions that practice what they preach.

Green Development for Coastal Areas

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Coastal areas are frontiers along about 356,000 km of global coastlines. It located at the border of land and sea. They integrate marine and terrestrial processes through mutual interactions, involving human pushed land–sea interactions. Half of the world' populations lives on or within 100 miles of a coastline and this number may increase dramatically in the next decade.

The importance of coastal areas:

1. The coastal areas include a variety of marine and terrestrial ecosystems covering the range from natural to extremely altered environments.
2. Coastal ecosystems such as mangroves, salt marshes, coral reefs, beaches, and dunes provide many regulating ecosystem services such as protection from coastal hazards like storms, coastal flooding, and coastal erosion.
3. As well, it contains habitats that are also highly relevant in terms of provisioning ecosystem services, such as nursery areas for maintenance of fish stocks in the case of mangroves.
4. Natural resources from oceans and coasts are fundamental components for human well-being.
5. The world's coastal areas generate a large portion of the ocean's services, and their support of coastal economies and livelihoods is especially important in less developed areas.
6. People are also drawn to the coast for recreational, aesthetic, cultural, and spiritual reasons, for the specific sense of place and well-being they attach to coastal environments, or for pursuing "coastal lifestyles". Every year, thousands of people flock to the warm, sunny beaches of coastal areas. For coastal states and island nations areas, coastal tourism is a complex factor for conservation and economic development. The United Nations World Tourism Organization indicated that there has been a steady rise in tourism recently, now accounting for 9% of global GDP. Coastal zones are attractive environments to settle and live or pursue economic activities.

However, population growth, urbanization trends and growing demand and competition for resources, transport, and energy are placing increasing pressures on coastal zones, their ecosystems, and the capacity to produce sustainable resources. This has also led to a rising human footprint on coastal ecosystems, including less charismatic but ecologically highly important ones like seagrass meadows or salt marshes, and convert to a threat to many species.



Tourism poses pressures and threats to the coastal environment

The main threats to coastal ecosystems are represented in habitat loss or conversion because of coastal development, agriculture, or aquaculture; habitat degradation caused by eutrophication, and contamination; and consequent changes in sediment and water supply due to human activities along the coasts and in the upstream watersheds. Additional pressures result from climate change, invasive species, and overexploitation of fishing resources. Coastal zones are typically also subjected to natural hazards such as flooding, storms, and tsunamis, with serious socio-economic impacts in coastal areas. Some of these effects are exacerbated by climate change and sea-level rise, and expected increases in the frequency and intensity of natural hazards along with preventative action taken to protect coastal property are further cause of habitat degradation. Meanwhile, poor planning, and a lack of awareness, regulations and enforcement are increasing the problems. Thus, the resulting changes affect directly and indirectly human well-being via many interlinkages and causal relationships.

Pressures on coastal can causes loss and damages outlined in:

- ★ Loss of human lives
- ★ Infrastructure and physical damages
- ★ Livelihood damages
- ★ Ecological damages:
- ★ Coastal landscape changes
 - » Coastal Erosion
 - » Coastal dumping of debris
 - » Effect on coral reef/sand dunes/Mangroves/estuaries
 - » Effect on biodiversity

Growing awareness of the pressure, that caused by urbanization, on vulnerable coastal ecosystems has contributed to growing research on coastal environment management. Although sustainable/green development has been highlighted for many years and attracted rising attention by the international community, the global usage of natural resources (e.g., energy resources) and environmental emissions such as CO₂ has dramatically increased, and the world is still dominated by “brown economy”.

Generally, the coastal areas are expected to create new economic opportunities and large growth in the marine and maritime sectors in both developed and developing countries when adopting new management systems. For example, Europe has relied on an explicit strategy targeting “blue growth”, a term developed from the approach of “green economy” to sustainable development and poverty enucleation by several governmental and non-governmental actors before, and presented at, the United Nations’ Rio+20 Conference for Sustainable Development in 2012. Blue Economy” has become increasingly popular in 21th century and covers three economic forms:

1. economy coping with global water crisis;
2. innovative development economy; and
3. development of marine economy

Coastal development includes a wide range of human activities such as beachfront construction of homes, roads, hotels, and restaurants, often for tourism. Also includes some things such eroded beach renourishment, seawalls construction, and nearshore dredging and oil platform construction. The Rio+20 outcome document, “The Future We Want”, acknowledges the significant role of “seas, oceans, and coastal areas” in sustaining the “Earth’s ecosystem”, and emphasizes the need for “conservation and sustainable use of the seas and oceans and of their resources”. It also obliges to “protect, and restore the health, productivity and resilience of seas oceans and marine ecosystems” through effectively applying “an ecosystem approach and the precautionary approach in the management of activities having an impact on the marine environment, to deliver on all dimensions of sustainable development”. Because of the double needs of economic development transformation and environmental civilization construction, sustainable development has received unprecedented attention. In fact, there are many practices should be performed such as decreasing emissions and promoting clean energy usage.

Under the growing attention in sustainable development in the coastal area, there is increasing confirmation about the potential sea level rise and expected extreme weather events in coastal more regions based on the projections of the Intergovernmental Panel on Climate Change (IPCC). This will aggravate local and regional marine and coastal challenges. Thus, this calls for integrated, interactive and adaptive coastal areas management.

Developing countries are vulnerable to environmental impacts because of some reasons:

1. They confront a combination of uncertain environmental impacts, because of climate change, such as rising average temperatures, exposure to extreme weather events, sea level rise and thus salt-water intrusion to adjacent areas;
2. Rising population densities in coastal areas;
3. Increasing inequalities in income with a large inflow of poor people as well as strong economic growth in certain places;
4. Changing geographical boundaries between urban and rural areas because rural-urban migration leads to the growth of surrounding urban areas;
5. A higher incidence of ‘land grab’ and ‘ocean grab’ in coastal regions; and
6. A changing dependence on the ecosystems of the region (e.g. drinking water resources, water for agriculture, fish resources).

Thus, some of adaptive practices and integrative management in coastal areas should be considered based on the future scenarios and present situation.

Green coasts are those coastal sites that managed according to standardized criteria and able to maintain a consistent improvement of conditions at the site.

In a simpler sense, coastal areas are managed in an environmentally friendly manner where environmental degradation is low and depend on clean and renewable energy resources. Greenhouse gas emissions there are low, and the balance of ecosystems and diversity of living organisms are considered. It is also considered that the local population are included in the protection and maintenance of the environment from degradation and the efficient and sustainable use of resources is necessary, not a luxury. Tourists must also take into account the conditions of the place and the requirements of environmental protection and act in an environmentally friendly manner that prevents or reduces the deterioration to the minimum possible extent.

Green Coasts Management:

The green coasts management aims to protect the three main coastal aspects namely:

1. Sensitive habitats;
2. Species; and
3. Cultural heritage.

As well, it allows local municipalities to sustainably manage those coastal areas outside of traditionally developed swimming beaches. This will consider the adequate monitoring and protection of the coasts, whilst also allowing for the development of low impact coastal tourism. Green coast management is not just another stretch of protected coastline but rather a platform for collaboration, innovation, and local public participation. Where possible, all green coast managements should aim to include a local residents association or public group who are able to mobilize active citizens to participate in the management of the site.

The green coasts criteria include aspects of basic ecological monitoring which allow for the setup of exciting new citizen initiatives. Thus, the objectives of the green coast management are two-fold: firstly: it aims to provide a system for sustainable management of sensitive coastal spaces and secondly: to engage local citizens to become involved in the management of these unique sites.

Green management means that we can build a healthier environment for all living creatures in both current and future generations.

Green management Guidelines aims to improve the quality of life for communities and affected individuals whilst minimizing the negative impacts on the environment and maintaining the long-term biological diversity and productivity of natural systems.

Green development Guidelines on Coastal and Marine Natural Resources:

1. Building well managed small-scale coastal fisheries;
2. Building a well-managed commercial fisheries sector;
3. Building a sustainably managed aquaculture sector;
4. Rehabilitation and recovery of coral reefs and seagrass beds;
5. Rehabilitation of mangroves and coastal wetlands;
6. Rehabilitation of coastal and marine ecosystems; and
7. Safeguarding marine and coastal sites for natural and cultural values

Therefore, new environmental management models need to be developed for sustainable planning of the coastal environment. To succeed, the management and the responses to change caused by human activities need to be:

Ecologically sustainable;

Technologically feasible;

Economically viable;

Socially desirable/tolerable;

Legally permitted;

Administratively achievable;

Politically expedient;

Ethically defensible;

Culturally inclusive; and

Effectively communicable

The coastal development tools adopted should meet all previous criteria, working on several levels) (i.e. involving citizens and institutions on a local, national and international level). The sustainable management should consider the following points of interest: recovery/respect for historical heritage; marine and coastal ecosystem functions that are threatened with extinction; the legal and administrative framework; economic prosperity and provision of social services; and climate change.



Restoring degraded coasts and mangrove



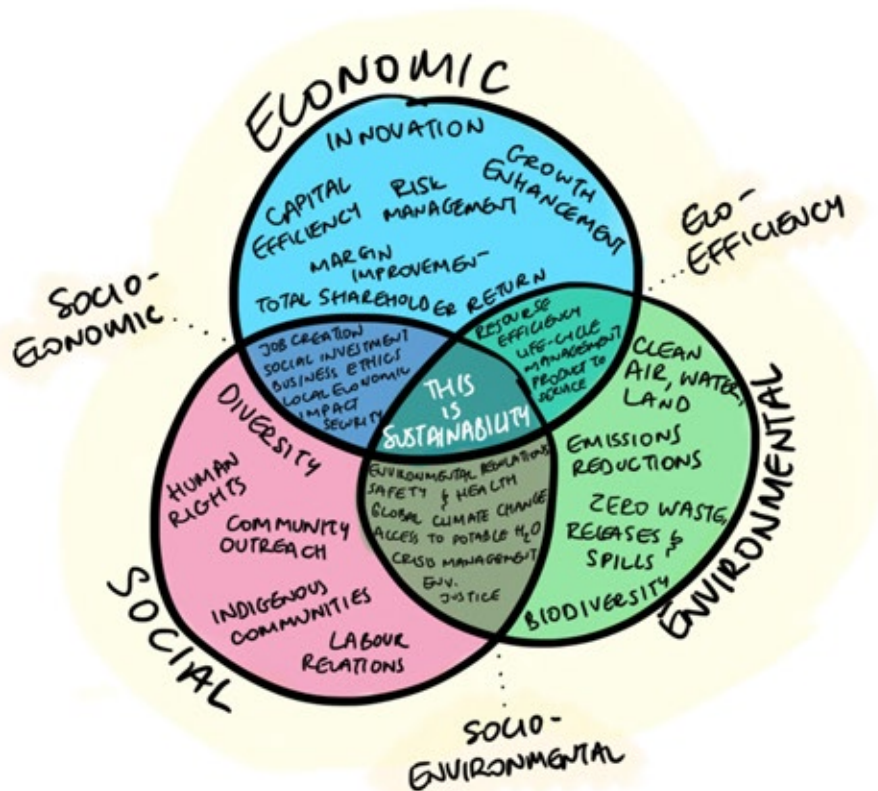
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Greening for Sustainability and the Cost of Inaction



Eng. Maritza VARGAS
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Terra-dev.org



“Greening for sustainability” may be seen as a redundant statement for those who know that Environment is one of the three pillars of sustainability (Environment, Economic and Social aspects). A simple statement, but worth explaining for those unfamiliar with the subject.

Now a days, with an increased demand and spending for sustainable advertising and all social media bombarded by buzzwords such as Green, Organic, Carbon footprint, Eco, Sustainable or Environmentally friendly, it makes individuals and businesses alike use these words without even understanding what they really mean. I believe it is imperative to give a proper explanation and that researchers, policy makers and activists try to understand better how to encourage actual sustainable thought and behavior effectively, especially in the understudied areas of cross cultural research and social media that should be used as tool to achieve a greener and sustainable future.



So, let's start from the beginning: when we talk about sustainability, we simply do something to achieve Sustainable Development.

“Sustainable Development” is an environmental principle (soft law) that was published for the first time in 1987 by the World Commission on Environment and Development (WCED) in the famous report “Our Common Future”, also known as the Brundtland Report, where Sustainable Development is defined as **“the development that meets the needs of the present without compromising the ability of future generations to meet their own needs”**.

Based on this definition, it is not possible to reach Sustainable Development while we compromise future generations to meet their own needs. Unfortunately for those who have not yet inhabited the planet, that is exactly what we are doing now when we pollute, diminish renewable resources,

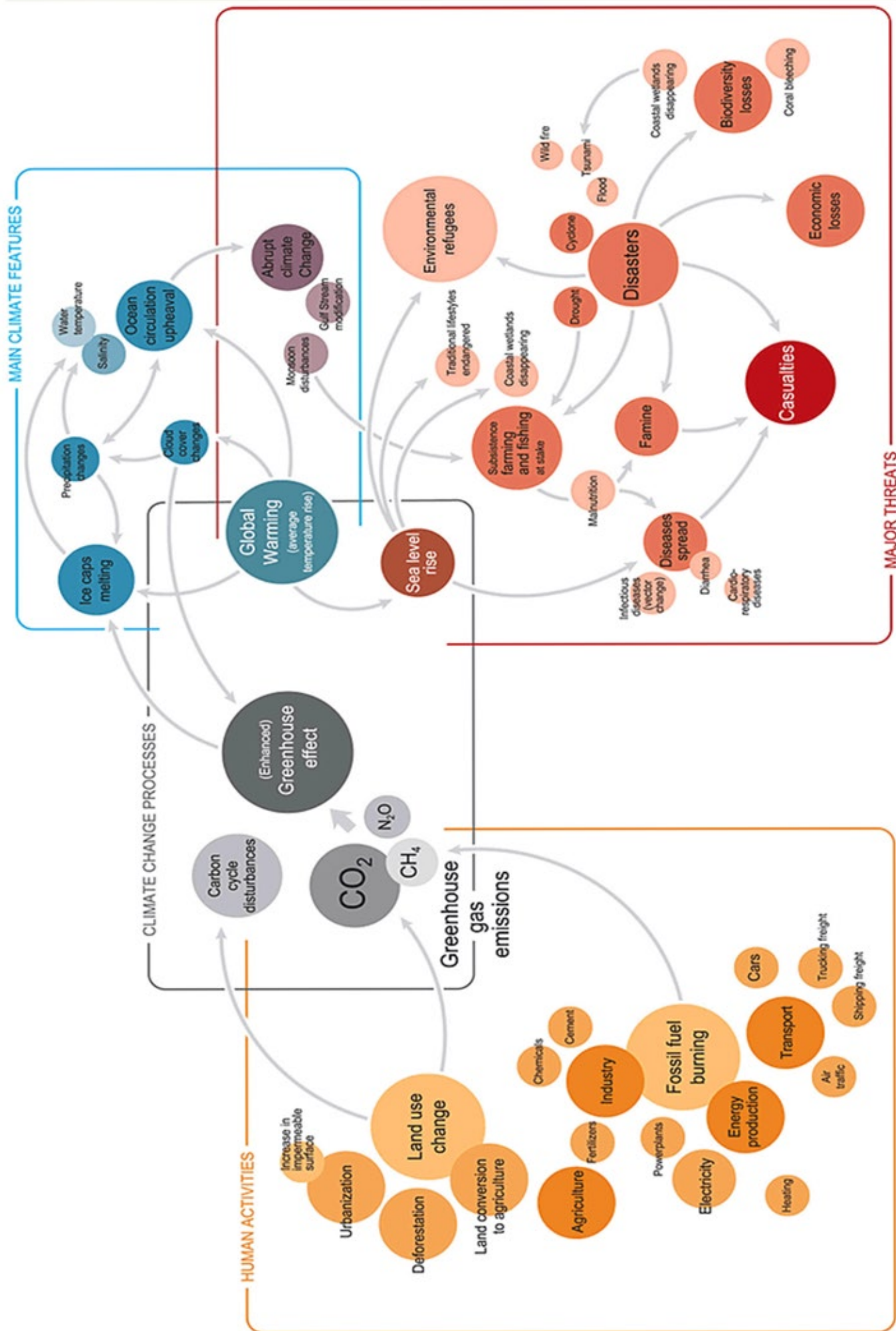
exhaust the reservoirs of non-renewables natural resources, and when we change the land use and push species and ecosystems to extinction. In other words, the world cannot develop in a sustainable manner if we don't protect the environment by avoiding and minimizing our negative impacts, restoring and rehabilitating ecosystems and offsetting the damages.

Being more conscious and responsible for our environmental impacts – Greening our activities – is actually contributing to reach sustainable development. In that sense, every \$ dollar we spend on “greening” the business, organization, institution, city or the economy it is an investment in sustainability, which only brings benefits for the future.

Greening for sustainability is not a difficult task, but it requires a **shift in priorities, open minds and long term planning**. The **priorities** must change from purely profits focused businesses to organizations that maximize profits by minimizing its environmental impact, lowering energy, water and resource consumption, avoiding extra expenditure in remediation, carbon taxes and environmental fines. We need to **open our minds** and consider innovative solutions to Eco-design products and services, considering minimum energy and resource use from design, production, transport, use and disposal. The goal should be zero waste and zero pollution at any stage, using clean energy and opening new markets of circular economy where the byproduct of one process is the input to another company as part of industrial ecology. Innovation in cleaner materials, products and services, aiming for sustainable production and consumption. We should also expand our **long-term** boundaries not only in the life span of products, building them to last and avoiding single use, but also at a global scale. The only way we can continue growing and developing is slowing down our hungry consumption of resources, because the planet has a limited capacity to provide those non-renewable and we are even depleting the renewables ones like timber, mangroves, coral reefs, ecosystems and their biodiversity, among others.

There is another extremely important reason to change and “Green” our behavior: our responsibility for and contribution to Climate Change. The diagram below from UNEP GRIP ARENDAL schematically shows the global effects of Climate Change and its interaction with climate features and major trends. If you take a time to read each of the circles, you'll see that all human activities are linked to climate change and that has a huge cost.





Source: UNEP / GRID ARENAL

© 2015 The Economist Intelligence Unit Limited report says that the potential impact of climate-related change on assets managed by investors can be expected as present-day losses of US\$4.2trn. In the case that global temperatures rise 6C more, those losses would more than triple (US\$13.8trn). The report also states that governments have no excuse for inaction. The risk of losses for the public sector is larger than for the private. In the case of 6C global warming scenario present value damages of US\$43trn can be expected. Those values consider the loss of assets, not human lives, nor environmental values.

We are at the point of no return, decisions should be taken now and not later on, we need to improve our risk management systems integrating climate change issues into regulations. Mitigation and adaptation to climate change is a responsibility of all.

1. https://eiuperspectives.economist.com/sites/default/files/The%20cost%20of%20inaction_0.pdf
2. http://www.gsi-alliance.org/wp-content/uploads/2017/03/GSIR_Review2016.F.pdf
3. <https://www.un-page.org>
4. <https://www.oecd.org/environment/climate-change-consequences-of-inaction.htm>

Smart Applications in Fishing and Fish Farm Management

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Internet of Things (IoT)

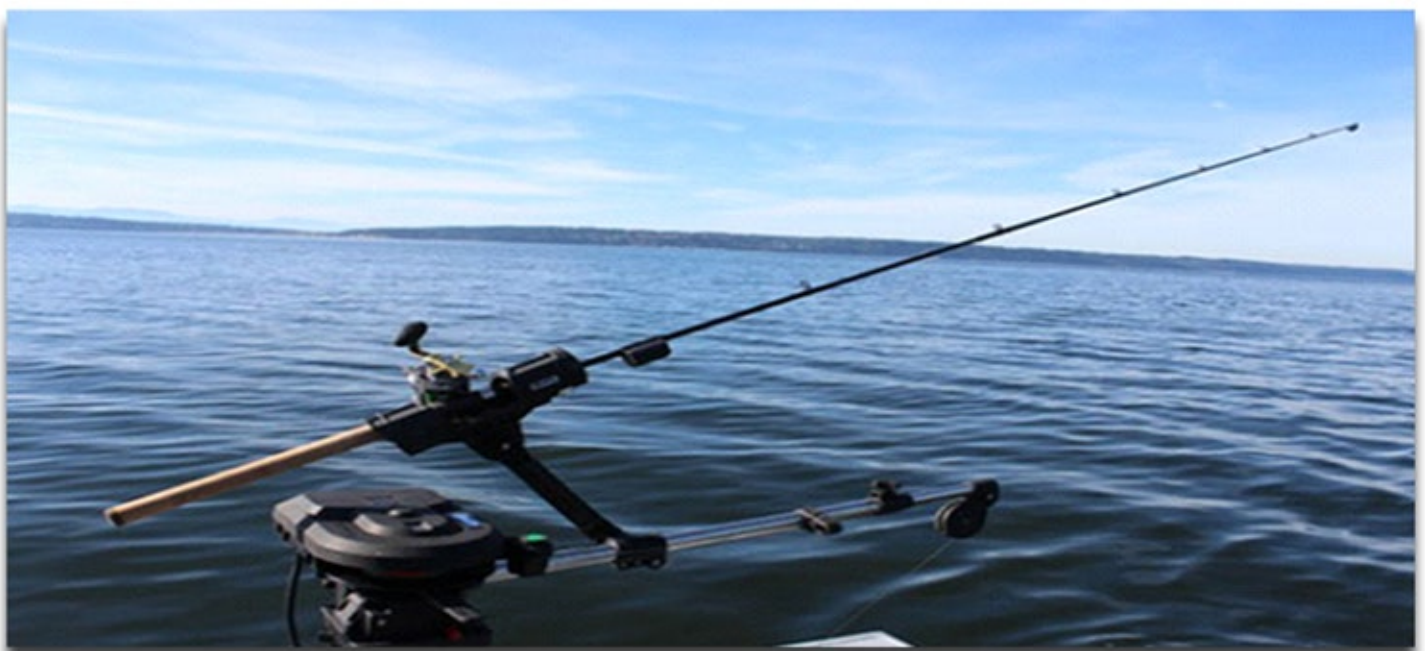
Internet of Things or Internet communications between devices and Things. Through the IoT, sensors can be deployed wherever you want to land, in water or in boats, to collect data on targeted inputs such as water temperature and salinity. The data collected is stored on a cloud storage system wirelessly, and users can easily access it online using a computer and smart phone. It also enables users to manually control the interconnected devices or full automation of any required actions.

The benefits to fish farmers from the IoT Application are twofold. They help reduce production costs and losses by rationalizing the use of inputs. In addition, IoT may help fish farmers increase production by improving decision-making by providing more accurate data.

Examples of some IoT Applications:

1. Smart Hook

IoT applications include Smart Hook, developed by Fish Sentry, a technology company in the United States, connected to a smartphone via the Internet. It helps in remote fishing without the need to wait for a long time, because it is equipped with a number of sensors, whether at the end or base, it captures dozens of readings every second to capture sudden tremors that may indicate the passage of fish in the water next to the hook. In addition, it is equipped with a built-in Bluetooth chip, which sends this information to its application on the smartphone to alert the user and pull the hook through the smartphone. Its application provided with a large number of features that help the user to locate the right place of fish and its amount underwater according to data collected from the site and weather.



2. Nilebot System

An Egyptian start-up company owned by newly graduated engineers developed the Nilebot System. Since last year, it has been marketed in 12 fish farms inside and outside Egypt for remote monitoring of fish farm water. The system is a device that enables the user to monitor water quality using IoT sensors and measures water quality factors such as:

- 1- PH
- 2- Dissolved oxygen concentration
- 3- Salinity
- 4- Temperature
- 5- Electrical Conductivity

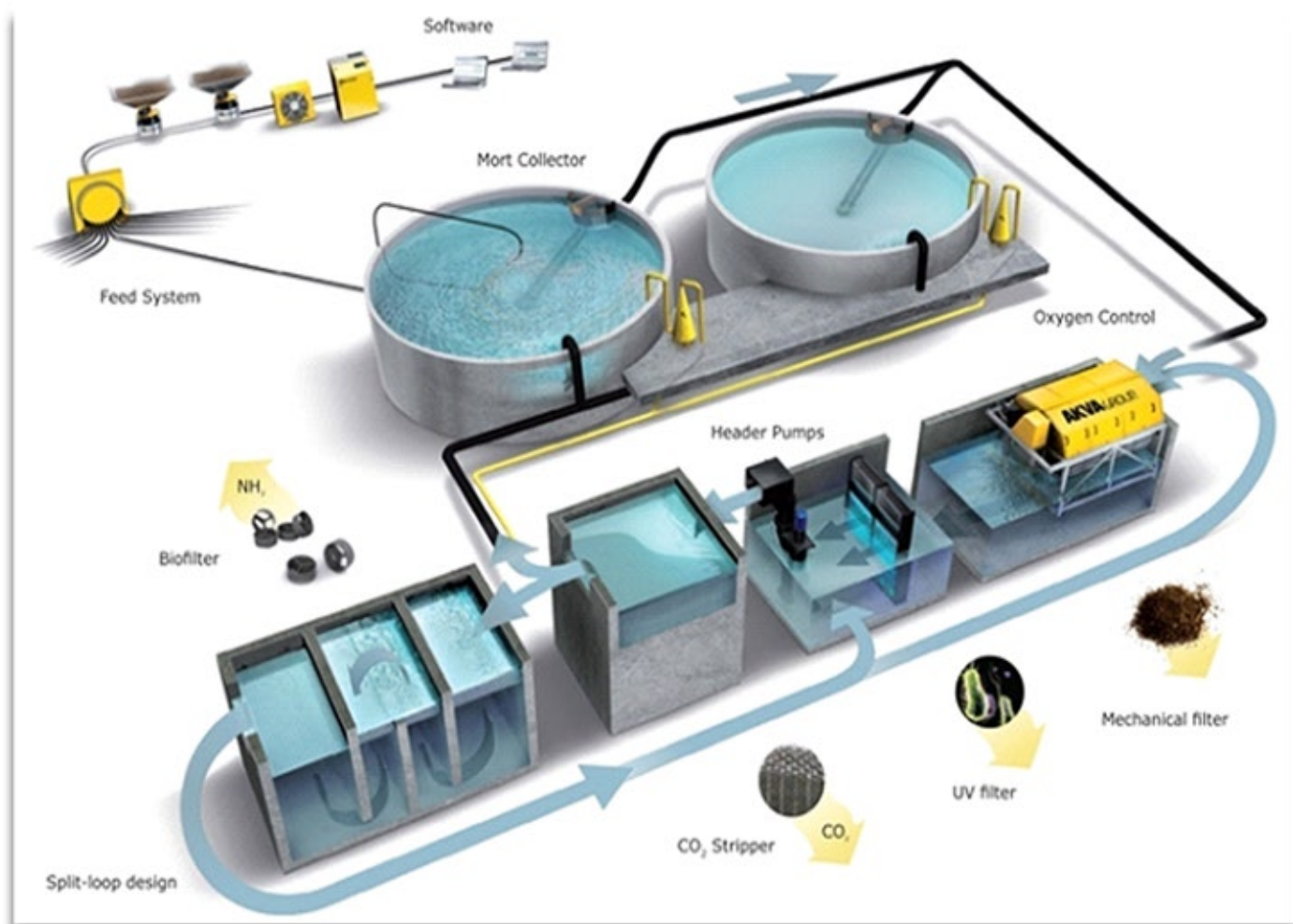
Then, the device that connected to the Internet sends the measurements to the system application on the smartphone to alert the user to monitor the state of the water of his farm. In addition, Nilebot System enables the farm owner to set the feature to send measurements periodically. In the event of an emergency malfunction, an instant alert is sent to the user's mobile phone so that the problem can be dealt with when it occurs, until the farm owner comes. It gives, for example, an order for the air turbine to operate in the event of a lack of oxygen in the water, or to order heaters to operate in the event of a severe drop in temperature. The device works with solar power to recharge automatically and easily, avoiding power outages.



3- Monitoring Fish Farms in Vietnam

Vietnam is one of the most important producers and exporters of fish worldwide. Its annual fish production is about 5,699,250 tons, which value of exports assumed to be worth US \$ 1.7 billion. The main markets for their production are located in Europe, USA, Mexico and China. The EU has already warned the wholesalers not to develop strict quality control measures on fish and aquaculture.

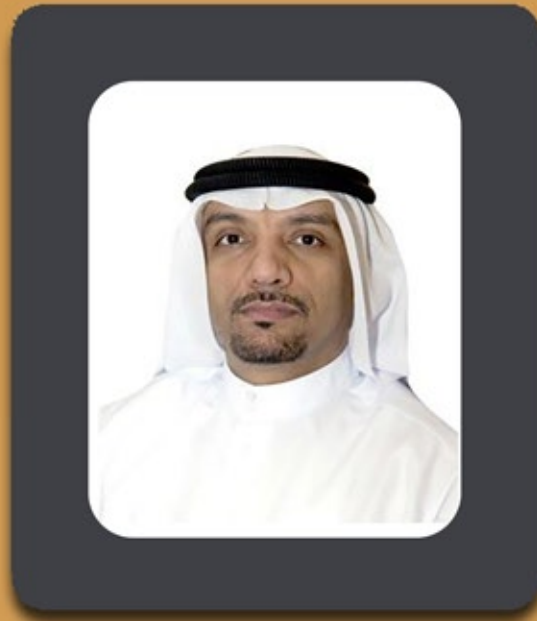
PHA Distribution, one of the leading IoT and ICT distributors in the Vietnam market, has deployed a wireless sensor network at a Vietnamese fish farm in Thanh Binh district, next to the Mekong River. The company has chosen a connecting tool that is fully equipped with well-designed sensors, easy to implement, expandable based on demands as well as low maintenance costs. The objective of the project is to monitor water quality and prevent some diseases that can affect fish in order to improve the quality and quantity of production.



4- Monitoring Shrimp Farms in Vietnam

Nguyen Van Khuyn, a shrimp farm owner in Vietnam, lost his production because of a very dry season that made his farm too salty to breed shrimp. The solution was not only to reduce the salinity of his farm to be fit for shrimp farming. There are many questions such as: when and how much fresh water should be released on the farm? How often salinity of water being checked? What is the solution if he is outside the town? Here comes the role of the IoT on how to find solutions and answers to all these queries. Sensors for water salinity, temperature, and appetite for shrimp can be installed to help track farm and shrimp conditions. These sensors will be connected to the farm management system - including a water regulator, nutrients, and ventilators, to inform farm management when fresh water is released to maintain optimum salinity and temperature levels. As long as farmers like Nguyen, have an Internet connection and a smart phone, they can remotely control their farms using mobile applications. optimum salinity and temperature levels. As long as farmers like Nguyen, have an Internet connection and a smart phone, they can remotely control their farms using mobile applications.





Khalid Mohammed Badri

Director of the Environmental Center for Arab Towns.

The environment forms the zone in which we are living and surrounding us, it includes soil, water, air, food and energy, where we influence and affects. In order to strive on the importance of protecting our environment, the Environmental Centre for Arab Towns (ECAT) works to raise environmental awareness through many environmental initiatives, including the issuance of this Envirocities e-Magazine. The magazine is one of the tools for education and environmental awareness to preserve our environment and natural resources, and to refine the human dimension of environmental issues, through the empowerment of people and get them to play active roles in order to achieve sustainable development. In addition, it plays a role in knowledge exchange and knowledge transfer and transfer of best practices on local, regional and international levels. It shows the importance of the role of society in changing behavior patterns and negative habits in dealing with the environment. Please note that the Environment Centre for Arabic Towns works under the umbrella of Dubai Municipality and belongs to Arab Towns Organization. ECAT objectives to raise environmental awareness, environmental education, capacity building and transfer of best practices on environment and sustainable development among Arab Towns.

The Environmental Center for Arab Towns is pleased to invite the professionals and interested persons in environmental issues to send their articles that we believe will enrich the Envirocities e-Magazine and helps raise environmental awareness and education. Please send your contribution to

nedalma@dm.gov.ae or ecat@dm.gov.ae.