



United Nations  
Educational, Scientific and  
Cultural Organization



Sustainable  
Development  
Goals

Bangkok Office

# NATURAL SCIENCES

Science for  
Sustainable  
Human Living in  
Asia-Pacific

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and

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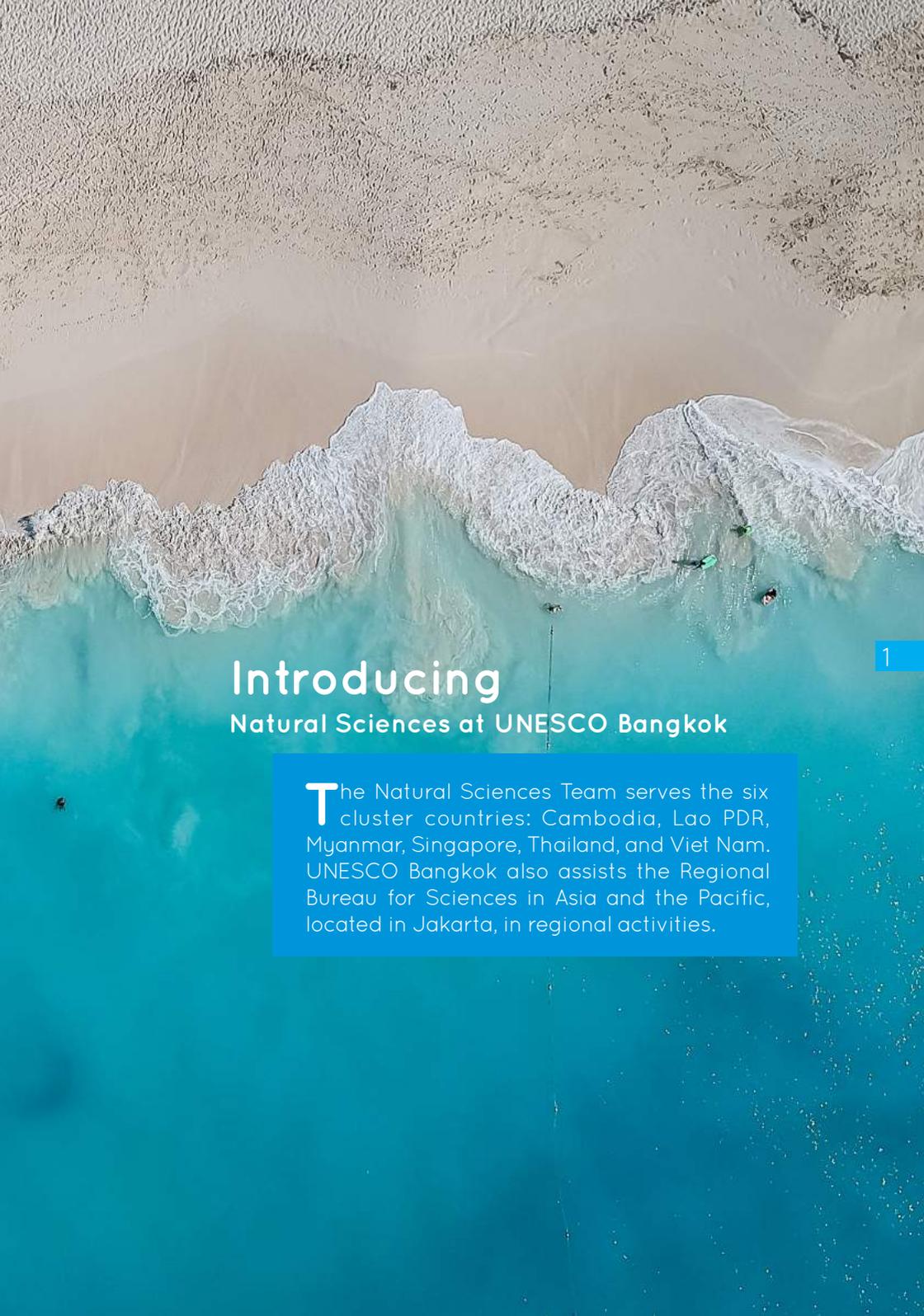
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# Introducing

## Natural Sciences at UNESCO Bangkok

**T**he Natural Sciences Team serves the six cluster countries: Cambodia, Lao PDR, Myanmar, Singapore, Thailand, and Viet Nam. UNESCO Bangkok also assists the Regional Bureau for Sciences in Asia and the Pacific, located in Jakarta, in regional activities.



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# The PLASTIC Initiative

Currently **13 million** tons of plastic enter the world's oceans every year. An estimated accumulation of **12 billion tons by the year 2050** lead to a bleak outlook for all life, damaging human health, the environment and the global economy.

As one of the current most pressing environmental issues, plastic pollution is a serious threat towards human well-being, the environment and biodiversity.

Asia especially is suffering from severe plastic pollution. **Over 70%** of the most plastic polluted rivers are found here, including the Indus, Ganges and Mekong rivers.

**We have a plan and we need your help!**



## The Challenges of Plastic

### Environmental

- Loss of biodiversity
- Degradation of marine ecosystems
- Reduced water quality

### Health

- Contaminated seafood
- Exposure to harmful chemicals from plastic degradation

### Economical

- Loss of tourism due to pollution
- Clean up cost

## The PLASTIC Initiative - Our Vision



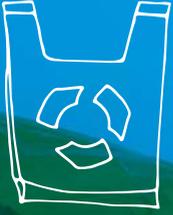
- A Scientific Steering Committee (SSC) and a Youth Advisory Council (YAC) will be established
- A conference of young people, governments, UN agencies, the general public and the private sector will propose new ideas and discuss existing ones to clean up and maintain the concerned ecosystems
- SSC and YAC together select the most promising proposal for funding
- Proposals will be trialed primarily in UNESCO Biosphere Reserves
- Success of the projects will be measured and evaluated
- Most effective strategies will be implemented and disseminated throughout UNESCO's network
- Government authorities will be encouraged to discuss the improvement of their own policies, practices, plans, law and law enforcement, versus plastic-management

**Clean up campaigns alone are not enough.**

We need to address the problem as a whole.  
Reduce plastic usage, plastic wastage and keep ecosystems clean.

**We are all responsible. Please support UNESCO.**





# The Plastic Initiative

Solutions for plastic waste management in Asia-Pacific through innovation and education

**‘Good plastic waste management has been delayed for too long because of our common blindness. We have to unleash human ingenuity to clean up the mess.’**

*(Benno Böer; Chief of the Natural Sciences Unit, UNESCO Bangkok Office)*

**P**lastic pollution poses a global threat to biodiversity. Specifically to animals such as cetaceans, seabirds and turtles; which often mistake plastic debris as common food sources, such as jelly fish or seaweed. Plastic ingestion can cause a suite of digestion problems in these animals, leading to reduced feeding behaviours, internal injury and death. Plastic netting or packaging can also trap and entangle marine animals, a phenomenon known as ‘ghost netting’ or ‘ghost fishing’, ultimately leading to choking or drowning. Plastic pollution also poses human health concerns. Micro (diameter between 1-5 mm) and Nano (1-1000 nm) plastics ingested by marine vertebrates and invertebrates can travel up the food chain, accumulating at higher levels and impacting other organisms including humans.

The Plastic Initiative has three main objectives:

1. To facilitate the funding and testing of innovative plastic waste management practices via proposals from youth participants from the Asia-Pacific region.
2. To promote sustainable education through complementary educational programs in new UNESCO Green Academies within the ASEAN cluster countries.
3. To create long-term national action plans by working in synchrony with the governments of the ASEAN cluster countries to coordinate long-term plastic-waste management plans.





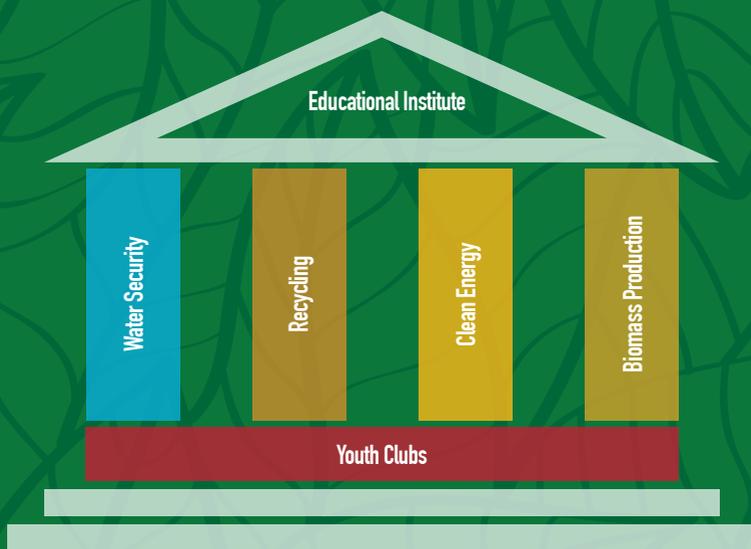
The main activities of this initiative are:

- 1) A youth conference discussing existing solutions and innovative ideas.
- 2) Establishment of a Scientific Steering Committee and Youth Advisory Council for idea selection.
- 3) Testing and idea implementation in UNESCO Biosphere Reserves and Global Geoparks.
- 4) Monitoring and feedback of projects led by the Scientific Steering Committee.
- 5) Set up of new UNESCO Green Academies for long-term education and knowledge dissemination.
- 6) Synchronize national plastic waste management action plans across the ASEAN cluster countries



# UNESCO Green Academies

Sustainable, eco-friendly, climate resilient educational institutions



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UNESCO Green Academies are physical infrastructures which promote practical and replicable environmental sustainability inside educational institutes. The academies are based on four pillars of sustainable development – Water Security, Recycling, Clean Energy and Biomass Production. They are built upon the foundation of a youth club, to

encourage active youth participation in achieving a sustainable way of life and promoting sustainability more widely in their communities.

Environmental science and sustainability are routinely taught in schools worldwide primarily through theory, leaving a gap between theoretical and real life practical application.



### WATER SECURITY

Rainwater Harvesting  
Wastewater Utilization



### BIOMASS PRODUCTION

Improve Air Quality  
Food or Biofuel Production



### RECYCLING

Plastic/Paper/Food Waste



### YOUTH CLUBS

Enhance scientific knowledge  
Practical learning experiences  
Environmental education & action:  
water security/recycling/clean  
energy/biomass production



### CLEAN ENERGY

Solar Panels/Biofuels/  
Geothermal/Wind

## Nature Based Solutions Provided by Green Academies

In Green Academies, students learn by experiencing firsthand how various measures are implemented in practice and how they can personally contribute to improved living conditions. Empowering youth to actively pursue sustainable lifestyle behaviors is vital to achieving global sustainable development goals.

The first UNESCO Green Academy was inaugurated in April 2016 inside the Lake Tana Biosphere Reserve in Bahir Dar, Ethiopia. The UNESCO Green Academy guidelines were launched in December 2016. Green Academies can be implemented in any number of settings and environments, including (but not limited to) Biosphere Reserves, rural communities and urban centers. New UNESCO Green Academies will be developed by UNESCO Bangkok in the ASEAN cluster as part of the 'Plastic Initiative', with a particular focus on plastic waste management education and activities at these sites.



▶ Students tending to the school garden



▶ Construction of a biogas production system



▶ Building an 86,000 liter tank for rainwater



# Mangroves

## Conservation, Development and Scientific Research

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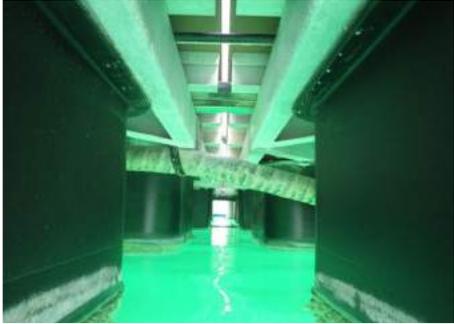
**M**angroves are incredibly productive plants, able to provide numerous goods and ecosystem services that are beneficial to both people and marine environments. These include fast growing timber and plant products, maintaining water quality, coastal protection, environmental tourism, and sustenance for fisheries in coastal communities. Additionally, mangrove ecosystems accommodate an exceedingly high level of biodiversity and play a major role as a carbon sink. The ability to grow in hypersaline environments also distinguishes mangroves as an extremely valuable source of freshwater independent biofuel.

UNESCO has supported the conservation, development, and scientific research of mangroves for many years, particularly through the establishment and science-based management of coastal UNESCO Biosphere Reserves. UNESCO Bangkok, in its strategic plan for 2019 and beyond, considers mangrove management in the Mekong Sub-Region as a priority. UNESCO is now in the process of setting

up a 'Mekong Mangrove Forum', with mangrove and nature conservation specialists from Cambodia, Myanmar, Thailand, and Vietnam, supported by the Manfred-Hermesen-Stiftung Foundation, Flora & Fauna International, and the Institute of Sustainable Halophyte Utilization at the University of Karachi. The forum will focus on practical interventions to redress the adverse anthropogenic impact on mangrove ecosystems. Initially, Myanmar will be at the center of this project, to offset mangrove habitat loss based on illegal logging for charcoal production. Establishing a new UNESCO Biosphere Reserve and testing floating mangroves for charcoal production capabilities will be potential activities. The floating mangrove platforms could be a vital tool for the legal production of charcoal, whilst maintaining and protecting the natural mangrove forests.



▶ Diagram of prototype floating mangrove barge (by Mourjan Marinas)



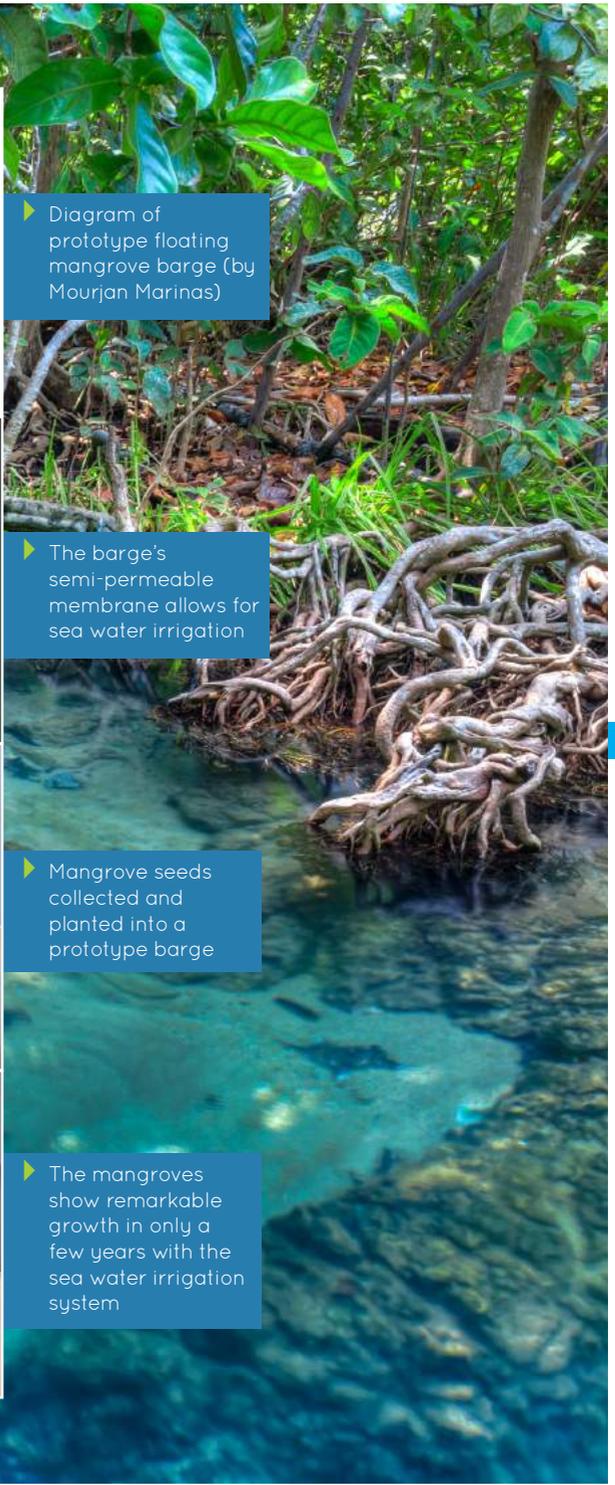
▶ The barge's semi-permeable membrane allows for sea water irrigation



▶ Mangrove seeds collected and planted into a prototype barge



▶ The mangroves show remarkable growth in only a few years with the sea water irrigation system



# Biosphere Reserves

Reconciling nature conservation and sustainable human living

**U** **NESCO** Biosphere Reserves promote an integrated approach to nature conservation and sustainable human living based on sound science and local community efforts. Reserve areas encompass terrestrial, marine and coastal ecosystems, and comprise three interrelated zones that aim to fulfill various complimentary and mutually reinforcing functions.



► Ranong Biosphere Reserve, Thailand

## CORE ZONE

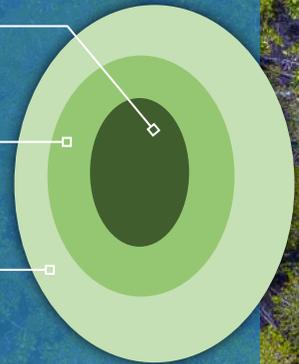
Protected area contributing to the conservation of landscapes, ecosystems and biodiversity.

## BUFFER ZONE

Ecological activities that reinforce scientific research, monitoring and education are permitted.

## TRANSITION ZONE

Socio-cultural and ecologically sustainable activities that foster human and economic development are permitted.



Recent decades can be characterized by dramatic environmental changes and resource exploitation, intensifying the need for effective implementation of best practices to assist in the conservation and functioning of existing sites, as well as the creation of new Biosphere Reserves. Natural Sciences at UNESCO Bangkok provides support

to Biosphere Reserves in the Cluster region and is actively involved in the continued development and identification of potential future reserves. Intellectual, technical and financial support from Government agencies, UN agencies, and the public and private sectors would be highly beneficial for this work.

# Global Geoparks

Landscapes of international geological significance

**U**NESCO Global Geoparks are areas of geological significance that establish a unique connection between natural science, culture and sustainable development. Geological heritage in these landscapes are inextricably linked to the culture, traditions and livelihoods of the communities that inhabit these areas and involve a holistic approach to conservation, education and sustainable development. Empowering local communities to develop mutually beneficial partnerships with the common goal of promoting the park's features, historical themes linked to geology, or aesthetic beauty, help create firm commitment to long term goals and provide opportunities for sustainable economic growth.

## Still developing

There are currently 140 Global Geoparks in 38 countries. Within the Mekong Cluster countries, Viet Nam and Thailand are home to three. Identification of potential future sites is a an ongoing initiative of the UNESCO Bangkok Office.



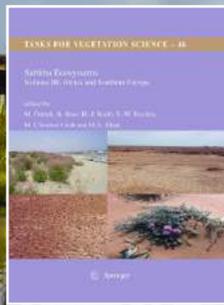
▶ Cao Bang UNESCO Global Geopark, Viet Nam

▶ Satun UNESCO Global Geopark, Thailand

# Sabkha Ecosystems: Asia-Pacific

Sabkha is an Arabic term for a flat salt desert. Sabkha ecosystems are of great importance for natural heritage conservation, geo-tourism, biodiversity aspects, ecosystem research and education. With an increase of freshwater, sabkha gradually turn into brackish lake systems, often dominated by reed-beds, such as Phragmites, Thypha, and Potamogeton and Zostera below the water surface. With an increase in seawater inundation, these ecosystems gradually convert into highly productive salt-marshes, salt-meadows, mangroves, and seagrass communities. Beginning in 2002, a comprehensive review of global

sabkha ecosystems was initiated through a multi-volume book series with the aim of comprehensively documenting sabkha conservation, development, and scientific research. Featuring a compilation of recent scientific studies, the inaugural volume explored sabkha ecology, land use, development and occurrence within the Arabian Peninsula. A further five books have since been produced, focusing on various parts of the world, including: West & Central Asia, Africa & Southern Europe, and the Americas. Most recently, the sixth volume in the series, focusing on Asia & the Pacific, was presented in Hanoi in March 2019.



2 ZERO HUNGER



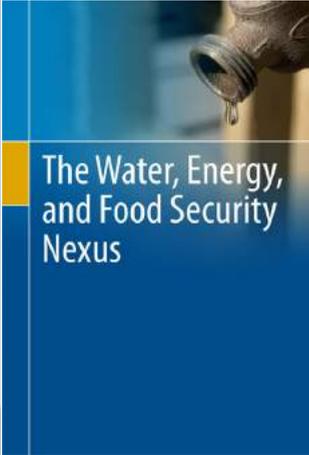
6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY

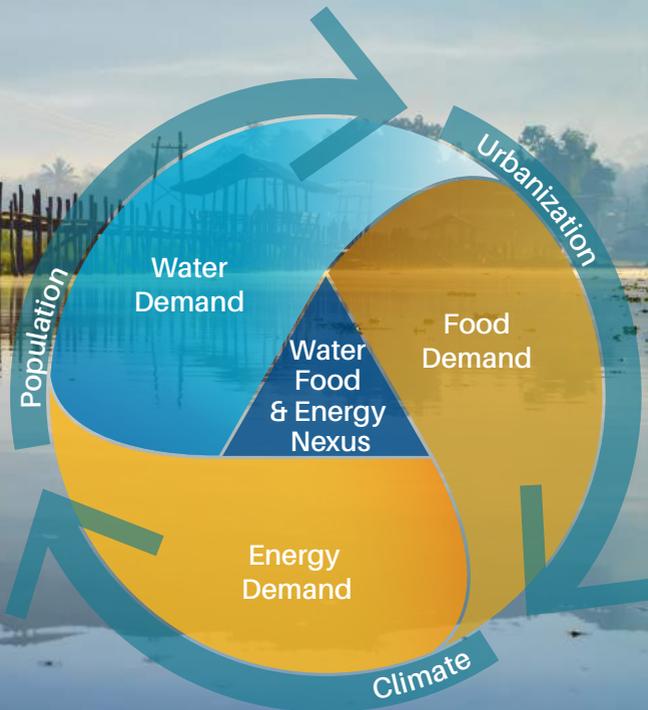


# Water, Food & Energy Nexus



Substantial increases in economic development and resource use in the Asia-Pacific region over the last several decades have far outpaced global averages. There is only a basic understanding of the complex connections between food, water and energy in the region and the potential impacts of future sustainable growth.

UNESCO Bangkok is currently producing a three part book series, each focusing on a different geographical region within the Asia-Pacific (Southeast Asia, Central & West Asia and Pacific). The series will analyze the intricate networks of supply and demand through a collection of recent research initiatives in the Asia-Pacific region.



# Women In Science

Promoting gender equality and the pursuit of excellence in science

Women have continued to make significant progress towards increasing participation in science, technology, engineering and mathematics (STEM) disciplines all over the world.



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► L'Oréal Thailand-UNESCO for Women in Science fellowship winners 2018

► The award ceremony was attended by Thailand's Vice Minister of Science and Technology, Dr. Kanyawim Kirtikara

However, a significant gender gap still persists, and the untapped potential of brilliant girls and women that choose not to pursue STEM careers because of difficult barriers represents an important lost opportunity for society as a whole. UNESCO remains committed to promoting gender equality in these fields and empowering women to pursue excellence in science.

The 'L'Oréal Thailand-UNESCO for Women in Science' fellowship program strives to recognize and support accomplished female researchers, and

encourage more young women to enter the profession by awarding funding grants to talented individuals. On 5 October 2018, the L'Oréal-UNESCO for Women in Science Awards celebrated women's STEM achievements with five 250,000-baht fellowships for outstanding female researchers. The fellowships were won by Dr. Chanchao Lorthongpanich, Assistant Professor Surapa Thiemjarus, Dr. Wirulda Pootakham, Assistant Professor Varisa Pongrakhananon and Dr. Chularat Wattanakit (as seen above).

# Celebration Days

## World Science Day for Peace and Development

10<sup>th</sup> November 2018

UNESCO Bangkok celebrated World Science Day for Peace and Development with an event with the Asian Institute of Technology (AIT), Thailand's National Science and Technology Development Agency (NSTDA) and the Ministry of Science and Technology (MOST). The event aimed to confront and find solutions to the global issue of plastic pollution, with a particular emphasis on engaging a new generation of students. Here, UNESCO Bangkok launched for the first time 'The Plastic Initiative', to find solutions for plastic waste management in Asia-Pacific through innovation and education.

Further key dates celebrated by UNESCO Bangkok:

## World Water Day

22<sup>nd</sup> March

## World Environment Day

5<sup>th</sup> June

## International Day for the Conservation of Mangroves

26<sup>th</sup> July



► UNESCO Cat Ba Biosphere Reserve, Viet Nam

# UNESCO Bangkok's Sustainability Plan

**U**NESCO is the leading UN agency for Education for Sustainable Development, aiming to provide access to quality education on sustainable development at all levels. We want to improve the sustainability of UNESCO's buildings by applying the concept of UNESCO Green Academies to the Bangkok office.

This includes making changes based upon four pillars of sustainable development – Water Security, Recycling, Clean Energy and Biomass Production, as well as changes in behavior which will be facilitated by environmental education resources for all UNESCO Bangkok employees.

## **Water Security**

On average, 1,498 mm of precipitation falls in Bangkok every year. By implementing a rainwater harvesting system at UNESCO Bangkok, large amounts of rainwater could be collected and used for the irrigation of the UNESCO tropical garden.

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## **Recycling**

Collecting and separating plastic waste is an equally high priority action. Bins could be placed on each floor so that the plastic waste can be collected and recycled. Long term, it is also an aim to recycle plastic at the UNESCO Bangkok Office. This could be achieved through the purchase of plastic recycling machines which would be able to shred, melt and reshape recyclable plastics into new shapes and forms.

## **Clean Energy**

Clean energy could be produced through the implementation of solar panels on the UNESCO Bangkok roof.

## **Biomass Production**

To promote the production of biomass, organic waste from the office can be collected in reusable plastic compost bins, to be separated to make a compost pile.

As a leading force in developing programs to improve sustainability, UNESCO Bangkok aims to set an example and adapt its building to become eco-friendlier and more environmentally sustainable, these initial steps will catalyze this process.

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