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NATURE & ENVIRONMENT OF VIETNAM

Việt Nam participates in the 27th Conference of the Parties of the United Nations Framework Convention on Climate Change - COP27

CHU THỊ THANH HƯƠNG
Department of Climate Change,
Ministry of Natural Resources and Environment

From November 6 to 18, 2022 in Sharm El-Sheikh (Arab Republic of Egypt), Minister of Natural Resources and Environment Trần Hồng Hà leads the Vietnamese Delegation to attend the 27th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) - COP27. Participating in the Conference, the representatives from line Ministries: Planning and Investment, Transportation, Agriculture and Rural Development, Construction and some enterprises.

The COP27 Conference has an important meaning in promoting the implementation of the commitments made at the COP26. It is expected that COP27 will be attended by the Secretary - General of the United Nations, leaders of many international organizations, international financial institutions and about 25,000 delegates from 196 member countries under UNFCCC.

1. ACTIVITIES UNDER THE CONVENTION

(i) *Mitigation:* Work program to scale up mitigation ambition and implementation established; parties urged to communicate new or updated NDCs (those who haven't done so yet); Sect requested to update the synthesis report on Nationally determined contributions (NDCs); High-level Ministerial roundtable on pre-2030 ambition at Conference of the Parties serving as the meeting of the Parties to the Paris Agreement 4 (CMA 4); Parties urged to communicate by CMA 4 long-term low greenhouse gas (GHG) emission development strategies; Section requested to prepare synthesis report on long term low emission development strategies.

(ii) *Adaptation:* Glasgow–Sharm el-Sheikh work program on the global goal on adaptation: Implementation of the work program to start immediately; the Intergovernmental Panel on Climate Change (IPCC) to engage in the work program; submissions requested; workshop themes to be selected; Sect to prepare annual report on workshops. Report of the Adaptation Committee: Review of the Adaptation Committee; submissions requested.

(iii) *Climate Finance:* definitions of climate finance; Article 2.1(c); progress report on achieving USD 100 billion goal; biennial high-level Ministerial dialogues; high-level Ministerial dialogue on progress and fulfilment of USD 100 billion goal; ad hoc work program from 2022 - 2024 established; four technical expert dialogues per year; submissions requested; high-level Ministerial dialogue in 2022.

(iv) *Loss and Damage (L&D):* Continue to discuss about the Warsaw International Mechanism. It focuses on the role and responsibility of the Secretariat, the necessary to establish the advisory board, role of the focal point on L&D. Glasgow dialogue for the funding of activities to avert, minimize and address loss and damage established.

(v) *Global Stock take (GST):* the preparation for the first Global Stock Take in 2023 to identify the gap and enhance the ambition for parties in mitigation, adaptation, financial contribution and technology support for developing countries.

(vi) *Market and non-market mechanism:* Subsidiary Body for Scientific and Technological Advice (SBSTA) to develop tables and outlines for the information required pursuant to Chapter IV (Reporting); develop recommendations for guidelines for the reviews pursuant to Chapter V (Review); develop recommendations relating to infrastructure, including guidance for registries, the international registry, the Article 6 database and the centralized accounting and reporting platform referred to in Chapter VI (recording and tracking).

Supervisory Body to elaborate and further develop: its rules of procedure; appropriate levels for the share of proceeds for administrative expenses and its operation; activities involving removals, including appropriate monitoring, reporting, accounting for removals and crediting periods…; application of requirements under the Methodologies Chapter of the rules.

SBSTA to develop recommendations on: responsibilities of the Supervisory Body and of Parties that host Article 6.4 activities; processes for implementation of the transition of activities from the CDM to Article 6.4; Processes for implementation of chapter use of certified emission reductions towards first or first updated NDCs; Reporting by host Parties on their Article 6.4 activities and the Article 6.4 emission reductions issued for the activities; the operation of the mecha-

nism registry; processes necessary for implementation of the share of proceeds; for the delivery of overall mitigation in global emissions; consideration of whether activities could include emissions avoidance and conservation enhancement activities

(vii) *Other issue:* In addition to the above contents, the parties will also continue to discuss many other issues such as the provisions of the Kyoto Protocol after 2020; gender and climate change; activities of the UNFCCC Secretariat, SBI, SBSTA, committees and other working groups.

▲ *G77 and China Meeting*

2. THEMATIC DAYS AT COP27

In addition to the activities prescribed by the Convention, the Kyoto Protocol, and the Paris Agreement as mentioned above, the host country offers thematic activities to promote cooperation and create consensus on issues related to issues, the following topics will be held:

(i) *Finance day:* The Finance Day will address several aspects of the climate finance ecosystem, including but not limited to, innovative and blended finance and financial instruments, tools and policies that has the potential to enhance access, scale up finance and contribute to the transition envisaged and needed, including those related to debt for environment swaps. The Finance Day will also feature the holding of one or more of the mandated events including Ministerial finance roundtable.

(ii) *Adaptation and Agriculture Day:* Adaptation Day will also provide an opportunity to discuss whole gamut of adaptation related issues including agriculture, nutrition, coastal areas livelihoods and protection, L&D, Disaster Risk Reduction and solutions to building resilience of agriculture and food systems to adverse climate impacts (droughts, floods…).

(iii) *Water day:* Water Day will cover all issues related to sustainable water resource management. the water day will comprise the different topics of water scarcity, drought, cross boundary cooperation and improvement of early warning systems.

(iv) *Decarbonization day*: The day would provide an opportunity to discuss such approaches and policies and to showcase technologies with an aim to encourage and facilitate the much-needed transition and paradigm shift towards a low carbon economy.

(v) *Science day:* It would provide an opportunity to engage with the science community and academia and bring their views into the conversation so as to ensure that all work and action is based on solid, credible science, and further discuss roles of academia in support for global action to tackle climate change

(vi) *Solutions day:* Possible solutions for the broad array of climate change challenges range from the holistic, cross cutting solutions such as greening of national budgets, or sustainable cities, multilevel action and sustainable transport, to sectoral solutions like waste management, alternatives to plastic and green building.

(vii) *Gender day:* The Gender Day aims to bring this issue to the forefront and to provide a platform to discuss existing challenges and to share success stories from around the world with a view to increasing awareness, sharing experiences, and promoting gender sensitive and responsive policies, strategies and actions. The day will shed light on the woman's role in adapting to climate change.

(viii) *Energy day:* The Energy Day would deal with all aspects of energy and climate change, including renewable energy and energy transformation, with a specific focus on just transition in the energy sector and green hydrogen as a potential energy source for the future. It would also include energy efficiency and ways to manage the envisaged global just transition in energy.

(ix) *Biodiversity day:* The day would deal with nature and ecosystem-based solutions. It would also allow the discussion about the impacts of climate change on biodiversity, ocean, coral reefs, ecosystem services, impacts of plastic waste

(x) *Youth and future generation day:* Ensuring that the voice of Youth and Future Generations is heard loud and clear is one of the objectives of the CoP27 Presidency. The day will provide an opportunity to display Youth success stories and challenges to respond to climate change.

(xi) *ACE and Civil Society Day:* Sharing best practices and identifying challenges, it will showcase the role and contribution of civil society in this area and across the board in different forms of climate action and policy response ■

The 33rd Meeting of ASEAN Seinor Official on Environment and related meetings

TRƯƠNG THỊ TUYẾT NHUNG
ASOEN Vietnam Office - Department of International Cooperation, Ministry of Natural Resources and Environment

Within the framework of ASEAN cooperation on the environment in 2022, the 33rd ASEAN Senior Officials Meeting on the Environment (ASOEN 33) and a series of related meetings are taking place from 3rd to 7th October 2022 in Siem Reap Province, Cambodia. The Vietnamese Delegation to attend the Conference series included Mr. Lê Ngọc Tuấn, Director of International Cooperation Department cum Chief of ASEAN Vietnam Office, Ministry of Natural Resources and Environment (MONRE) as the Head of the Delegation. Delegation members include units under the Ministry (International Cooperation Department, Department of Climate Change, Nature and Biodiversity Conservation Agency, Vietnam Environment Administration, Center for Natural Resources and Environment Communication) and ASEAN Department, Ministry of Foreign Affairs.

▲ *ASOEN Officials join hands to solve environmental problems*

This is a very important series of high-ranking officials meeting in the ASEAN cooperation mechanism on environment which was held annually. Attending the Conference series were representatives of senior officials from ASEAN member states, the ASEAN Secretariat, ASEAN partner countries including Japan, Korea, China, the United States, the EU and a number of international organizations…

From October 3rd to 5th, 2022, at the 33rd ASOEN Meeting and related consultation meetings, ASOEN Officials reviewed and reported on environmental cooperation activities in 2021 - 2022 in order to build cooperation plan in 2023 and prepare the contents of the report at the upcoming 17th ASEAN Ministers of Environment (AMME) meeting. After reviewing and evaluating, ASOEN Officials agreed to nominate 4 ASEAN Heritage Parks (AHPs) out of 10 dossier sets of National Parks (NPs) proposed for consideration at the 32nd ASEAN Working Group Meeting on Biodiversity (previously took place on 9th to 10th September 2022). Specifically, Pasonanca Primeval Park (Philippines); Primeval Park in the Inayawan Mountains (Philippines); Bạch Mã NP (Việt Nam); Côn Đảo NP (Việt Nam).

These are 4 AHPs, calculated in order from 52 to 55 of ASEAN, expected to be submitted to the ASEAN Environment Minister for approval and awarded the AHP Certificate at the 17th ASEAN Environment Ministers Meeting. Bạch Mã NP and Côn Đảo NP of Việt Nam have received strong consensus and support from ASEAN member countries. This is a remarkable result of Việt Nam in the field of biodiversity conservation.

Since the AHPs Program was started by ASEAN countries to date, Việt Nam has had 10 NPs recognized as AHPs. The fact that Bạch Mã and Côn Đảo are expected to become the 54th and 55th AHPs will contribute to increasing the number of National Protected Areas of Việt Nam to 12 AHPs next year.

At the official opening ceremony of the 33rd ASOEN and Summits held on the morning of October 5th, 2022, in Siem Reap. Attending and delivering the opening speech, Mr. Tin Ponlok - Secretary of State of Cambodia's Ministry of Environment emphasized: "ASEAN is preparing a strategy for socio-economic development after the Covid-19 pandemic. Governments of ASEAN member countries have been focusing on environmental work, green economic development, smart cities, sustainable development... At the same time, ASEAN leaders have been completely restructuring the economy to focus on sustainable production and consumption along with the circular economy…".

Representatives of ASEAN member countries, ASEAN Chair 2022, Cambodia has set out a strategy with the theme "ASEAN tackles common challenges", Cambodia is strengthening regional cooperation with all stakeholders. to address regional and global environmental problems.

The 33rd ASOEN then reviewed and reported on the cooperation activities of the ASEAN Senior Officials Organization on the environment including 8 areas, specifically: Climate change; Water resource management; Marine and coastal environment; Biodiversity conservation; Environmentally sustainable city; Chemicals and waste; Environmental education and transboundary haze pollution… The Working Groups reported the activities of the past year to the ASOEN Chairman and proposed an action plan to implement the ASEAN Strategic Plan on Environment in the coming period. ASEAN Officials discussed and made important decisions under the activities of the ASEAN Working Groups on the environment in the framework of annual ASEAN cooperation.

▲ *Việt Nam is co-chair at the ASEAN - Korea Dialogue on Environment and Climate Change*

ASOEN OFFICIALS JOIN HANDS TO SOLVE ENVIRONMENTAL PROBLEMS

Next, on October 6 - 7, 2022, a series of conferences between ASEAN and its Partners were held immediately after the 33rd ASOEN, including: The 2nd ASEAN - Japan Dialogue on the Environment (AJDEC), the 2nd ASEAN - Korea Dialogue on Environment and Climate Change; The 4th ASEAN - EU Summit on Environment and Climate Change; The 2nd ASEAN - US Dialogue on Environment and Climate Change; ASEAN+3 Summit on Environment.

Accordingly, the second ASEAN - Japan Dialogue on the Environment (AJDEC) was held to review the progress of joint activities within the Framework of the "ASEAN - Japan Environmental Cooperation Initiative" at the Ministerial level, including the "ASEAN - Japan Climate Change Action Program 2.0". This program has received support from Japan for ASEAN member states in the past time and promoted possible cooperation between ASEAN and Japan in the coming time.

The 2nd ASEAN - Korea Dialogue (ASEAN - ROK) on Environment and Climate Change, at this Conference, Việt Nam, as a co-chair country with Korea, hosted the Conference.

The Officials reviewed, considered and made recommendations to promote cooperation in the fields of environment and climate change, which is an issue of great concern to countries after COP26. The ASEAN - Korea Dialogue on Environment and Climate Change is noted as follows: (i) Sharing of policies on climate change and environment, including on energy in the context of countries joining hands to solve the problem on climate change; (ii) Discuss specific topics or projects related to the areas of ASEAN - Korea cooperation and exchange views on regional and global challenges as well as emerging issues in related fields.

Speaking at the opening of the ASEAN - Korea Dialogue on Environment and Climate Change, Mr. Lê Ngọc Tuấn, Director General of International Cooperation Department and Chief of Office of ASOEN Vietnam, MONRE emphasized that: "Climate change is now becoming more serious and has really become the biggest challenge, an urgent problem for humanity. ASEAN countries are

suffering from many impacts of climate change, affecting people's living environment. Adapting to climate change is a matter of survival, reducing greenhouse gas emissions is an urgent matter for sustainable development of the country and protection of the climate system and environment in the region and the world.

At the 26th Session of the Conference of the Parties to the UNFCCC (COP26), ASEAN countries pledged to address climate change and advance the implementation of regional priorities towards a more resilient and sustainable future. Most of them have set targets to achieve net-zero emissions or become carbon neutral by mid-Century. In that context, ASEAN highly appreciates Korea's valuable support and efforts in promoting cooperation with ASEAN to address the above-mentioned challenges in recent years…".

Through this Dialogue, Korea and ASEAN reaffirmed their commitment to strengthen cooperation on environment, climate change and energy in order to contribute to the sustainable development of each country, region and the world, towards a society that reduces carbon pollution and responds to climate change.

The 4th ASEAN - EU Senior Officials Meeting on Environment and Climate change aimed at reaffirming the commitment to strengthen cooperation between ASEAN and the EU on common regional and global challenges related to environmental protection and climate change. For the purpose of strategic planning and setting direction to further deepen cooperation and strengthen the partnership between ASEAN and EU, covering topics included: (i) Sustainable production and consumption, circular economy policies and practices, carbon reduction and environmental pollution; (ii) Green development recovery after COVID-19. The discussions also mentioned the content of the European Green Initiative to support financial solutions for the activities of ASEAN - EU in the coming time.

On October 7th, 2022, the 1st ASEAN - US Senior Officials Meeting on Environment and Climate Change, the 19th ASEAN+3 Senior Officials Meeting on the Environment was held with the following notes:

▲ *Vietnamese Delegation attended ACB Conference to select ASEAN Heritage Parks*

ASEAN - US Dialogue on Environment and Climate Change will create a forum for the US and ASEAN countries to exchange information on action targets on the environment and climate change, with the ambition of achieving targets to reduce emissions and improve resilience.

The first dialogue will focus on the development of the ASEAN - US Action Plan on Environment and Climate Change, based on the Climate Change Action Plan of the ASEAN Working Group on Climate Change that has connected with all the ASEAN member countries.

The 19th ASEAN+3 Senior Officials Meeting on the Environment is periodically held with the full attendance of ASEAN member states and strategic partner countries such as China, Korea and Japan.

The Conference reviewed and evaluated completed and ongoing activities and considered new proposals within the framework of ASEAN+3 environmental cooperation in the years 2022 and 2023. The contents of the ASEAN+3 Initiative on Action Plan to reduce marine plastic waste are discussed in detail. The Conference has also heard reports on the progress of implementing the ASEAN - China Strategic Framework for Environmental Cooperation (period 2021-2025), ASEAN - Korea Cooperation on the Environment and the ASEAN - Japan Cooperation Initiative on Environment... This can be considered an important environmental event in 2022. The Conference series with the participation of more than 100 delegates from ASEAN and ASEAN partner countries spent a productive week in Siem Reap.

The Vietnamese Delegation actively participated and contributed to the activities of the Conference series. With remarkable initial results, the Delegation is highly appreciated by ASEAN member countries and hopes that Việt Nam and other countries will strengthen close cooperation on environment in the coming period ■

New regulations on tasks and organizational structure of the Ministry of Natural Resources and Environment

On September 22nd, 2022, the Prime Minister of the Government issued Decree No. 68/2022/ND-CP defining the functions, tasks, powers and organizational structure of the Ministry of Natural Resources and Environment (MONRE). Accordingly, the MONRE is an agency of the Government, performing the state management function in the following fields: Land; water resources; mineral resources and geology; environment; hydrometeorology; climate change; surveying and mapping; integrated management of natural resources and environmental protection of sea and islands; remote sensing; state management of public services in the fields under the management of the Ministry.

The MONRE performs the tasks and powers specified in the Government's Decree No. 123/2016/ND-CP dated September 1st, 2016 defining the functions, tasks, powers and organizational structure of Ministries and Ministerial-level agencies, Decree No. 101/2020/ND-CP dated August 28, 2020 of the Government amending and supplementing a number of articles of Decree No. 123/2016/ND-CP and the following specific tasks and powers:

Regarding land, the MONRE is responsible to the Government for uniform management of land throughout the country in accordance with Law.

In addition, guiding and inspecting the survey, measurement, cadastral mapping, current land use map and land use planning map; the formulation, adjustment and implementation of master plans on land use; land allocation, land lease, land recovery, change of land use purpose; the registration of land use rights, ownership of houses and other land-attached assets; the creation and management of cadastral records; the issuance of certificates of land use rights and ownership of houses and other land-attached assets; the implementation of rights and obligations of land users as prescribed by Law.

To assume the prime responsibility for elaborating, adjusting and publicizing national master plans and plans on land use; submit to the Prime Minister the allocation of national land use quotas after the National Assembly decides; submit to the Prime Minister to establish a Council to appraise national land use planning, national defense and security land use planning; appraisal of provincial-level land use plans, national defense and security land use plans.

Appraise the conversion of land use purpose of rice-growing land, protection forest land and special-use forest land in accordance with the Land Law.

To guide the arrangement of land fund for real estate market development in land use master plans.

▲ *Headquarters of the MONRE*

To assume the prime responsibility for and coordinate with relevant Ministries and branches in formulating principles and methods for determining land prices, submitting them to the Government for promulgation or submitting to competent agencies for promulgation; guide the formulation and adjustment of land price lists and specific land valuation according to the provisions of the Law on Land; land price mapping.

To guide and inspect the recovery of land, development of the land fund and the management of the recovered land fund; the auction of land use rights and land use management in bidding for projects using land in accordance with Law...

Regarding water resources, the MONRE conducts state management of water resources and manages river basins nationwide to ensure security of water resources.

Organize the building of models of economical use of water efficiently and economically; disseminate and propagate water-saving models, technologies and equipment; guide the implementation of regulations on incentives for economical and efficient use of water.

To guide, examine and organize the grant, extension, adjustment, suspension, revocation and re-grant of permits for prospecting, exploitation and use of water resources and underground water drilling practice; approve the transfer of the right to exploit water resources in accordance with Law.

Resolve problems and disagreements arising in the exploitation and use of water resources, discharge of wastewater into water sources for cases under the competence to grant permits, other problems related to water resources among provinces and centrally run cities…

To guide, inspect and organize the implementation of policies and laws on methods of calculation and collection of fees for granting water exploitation rights; decide to approve, adjust and notify the arrears and refund of money for granting the right to exploit water resources for the case of exploitation and use of water resources under its competence.

Regarding the environment, the MONRE shall direct, guide, inspect and organize the control of pollution sources for establishments, production, business, concentrated services and industrial clusters according to provisions of the Law.

Perform state management of solid waste in accordance with Law; direct, guide and inspect the management of ordinary industrial solid waste, domestic solid waste, hazardous waste, recycling, collection and treatment of waste by manufacturing, exporting and importing organizations and individuals according to the provisions of Law; guide and inspect establishments using imported scrap as raw production materials in accordance with Law.

Technical guidance on prevention and response to waste incidents; direct, guide, inspect and organize the implementation of: Environmental quality management, environmental improvement and restoration, environmental protection work in the management of persistent pollutants and raw materials, fuels, materials, products, goods and equipment containing pollutants that are difficult to decompose…

Regarding the organizational structure, the MONRE has 27 units, including: 1 - Department of International Cooperation; 2 - Department of Planning - Finance; 3 - Department of Science and Technology; 4 - Legal Department; 5 - Department of Organization and Personnel; 6 - Land Department; 7 - Department of Environment; 8 - Inspectorate of the Ministry; 9 - Office of the Ministry; 10 - General Department of Meteorology and Hydrology; 11 - Department of Nature Conservation and Biodiversity; 12 - Department of Seas and Islands of Vietnam; 13 - Department of Climate Change; 14 - Department of Digital Transformation and Information of Environmental Resource Data; 15 - Land Information and Registration Department; 16 - Department of Geology of Vietnam; 17 - Vietnam Land Information and Registration Department; 18 - Department of Geology of Vietnam; 19 - Department of Environmental Pollution Control; 20 - Department of Water Resources Management; 21 - Department of Planning and Development of Land Resources; 22 - Department of National Remote Sensing; 23 - Institute of Strategy and Policy on Natural Resources and Environment; 24 - Newspaper of Natural Resources and Environment; 25 - Journal of Natural Resources and Environment; 26 - National Center for Planning and Investigation of Water Resources; 27 - School for training and fostering staff of Natural Resources and Environment.

The units specified from (1) to (22) are administrative organizations that assist the Minister in performing the state management function, the units specified from (23) to (27) are public non-business units that serves the state management functions of the Ministry. The Minister of Natural Resources and Environment shall submit to the Prime Minister: Regulations on functions, tasks, powers and organizational structure of the General Department of Meteorology and Hydrology; promulgate a list of other public non-business units under the Ministry. The Minister of Natural Resources and Environment shall prescribe the functions, tasks, powers and organizational structure of the units under the Ministry, excluding the General Department of Meteorology and Hydrology ■

MAI HƯƠNG

New points on determining damages caused by deterioration of the function and usefulness of the environment according to the provisions of the Law on Environmental Protection 2020

HOÀNG BÍCH HỒNG
Institute of Environmental Science

Determination of damage caused by deterioration of the function and usefulness of the environment (environmental damage determination) is understood as the activities of competent agencies, organizations and individuals in the use of methods and means... in according to the prescribed order and procedures in order to determine the scope, area and sites of the environment being polluted or degraded; the number of environmental components is reduced, types of ecosystems, species are damaged; The damage level of each environmental component, ecosystem and species serves as the basis for determining liability for compensation for damage due to the decline in the function and usefulness of the environment (compensation for environmental damage).

The Law on Environmental Protection (LEP) in 2014 stipulates the determination of damage caused by environmental pollution and degradation (Article 165) and detailed instructions in Decree No. 03/2015/ND-CP regulations on determining damage to the environment. After 6 years of implementation, besides the advantages, the regulations on environmental damage determination have revealed a number of problems and inadequacies that need to be amended, supplemented and perfected. The regulation on environmental damage determination in the LEP in 2020 in Section 2 and specifically guided in Section 3, Chapter IV of Decree No. 08/2022/ND-CP guiding the LEP has some new points on: Principles for determining responsibility on compensation for environmental damage; environmental components which are determined environmental damage; the content of environmental damage determination; methods and methods of environmental damage determination.

PRINCIPLES OF DETERMINING LIABILITY ON COMPENSATION FOR ENVIRONMENTAL DAMAGE

The principle of determining responsibility for compensation for environmental damage is a newly added content compared to the LEP 2014. The identification of organizations and individuals causing environmental damage must be timely, objective and fair. Organizations and individuals causing damage to the environment must compensate for all damage caused by them and at the same time must pay all costs of determining damage and carrying out the procedures for claiming compensation according to regulations. Organizations and individuals have the right to prove that they have not caused damage to the environment and when the results prove to be correct, no compensation for environmental damage is required and not bear the costs related to damage determination and carrying out the procedures for claiming environmental damage. For cases where there are 2 or more organizations or individuals causing environmental damage, the responsibility for compensation for environmental damage shall be determined based on the proportion corresponding to the proportion of damage caused to the total environmental damage. In case the concerned parties or the state management agency in charge of environment cannot determine the proportion of responsibility, the arbitration body or the Court shall decide according to its competence.

ENVIRONMENTAL COMPONENTS ARE DETERMINED ENVIRONMENTAL DAMAGE

In theory, damage to the natural environment is understood as damage to all the physical elements that make up the environment such as soil, water, air, sound, light, organisms, ecosystems and other physical forms. However, it is currently not possible to determine damage to all of the above-mentioned environmental components. Through scientific debates at the national and international levels, determine environmental damage should only include damage to land, water, air and biodiversity. As for the air environment, with its diffusion characteristics, it is difficult to determine environmental damage, so the consideration of whether the damage object is compensated or not is a controversial issue. Similarly, damage to biodiversity should also be limited to damage to ecosys-

tems and species caused by pollution and environmental degradation, to distinguish it from damage to biodiversity caused by direct acts of harming species and ecosystems, which are legal in nature as a result of violations of regulations of the Law on Biodiversity Conservation rather than a violation of LEP.

Therefore, Decree No. 08/2022/ND-CP guiding the LEP in 2020 stipulates the objects that can be identified as well as feasible and suitable to actual conditions. Specifically, Clause 1, Article 115 of this Decree stipulates that the objects of determination of environmental damage include:

- Environmental components: Surface water environment, soil environment.

- Ecosystems include: Forests (on land and mangroves); coral ecosystem; seagrass ecosystem.

- Animals and plants distributed in Việt Nam, which are dead, must be on the list of endangered, precious and rare species prioritized for protection; endangered, precious and rare species of forest plants and animals; endangered species of wild fauna and flora listed in CITES Appendices.

CONTENTS OF THE DETERMINATION OF ENVIRONMENTAL DAMAGE

The LEP 2014 stipulates 2 main contents of the determination of environmental damage: (1) Determining the scope and limitations of the environment with reduced functionality and usefulness, including: Determining the limits and area of the site and core area which are severe and especially severe reduced; Determining the limit, the area of the direct buffer zone is reduced; Determine the limits and areas of other areas affected by the core and buffer zones. (2) Identification of degraded environmental components including: Determination of the number of degraded environmental components, types of ecosystems, and species of damage; The degree of damage of each environmental component, ecosystem and species.

From the LEP 2005 to the LEP 2014, there are 3 levels of deterioration in the function and usefulness of the environment, namely: degradation, serious degradation and especially serious degradation (Clause 1, Article 131 of the LEP in 2005 and Clause 1, Article 165 of the LEP in 2014). However, it is very difficult to fully quantify the above three levels of deterioration as a basis for determining damage levels.

From the theoretical and practical point of view, it is difficult to measure and count the actual decline in function and usefulness of each environmental component when they are polluted or degraded. In this case, it is necessary to apply the method of logical speculation, according to which the damage to the natural environment can be divided into 3 levels corresponding to 3 levels of deterioration in the function and usefulness of the environment: polluted, serious polluted, particularly serious polluted. Similarly, it is also possible to determine the levels of environmental degradation in terms of functionality and usefulness based on the levels of environmental degradation. Since the degree of environmental degradation can also be determined on the basis of the quantity of the environmental component that is over-exploited or overused compared to its natural status; based on the actual scarcity of environmental components or the State's priority in the management, protection and development of each environmental component... Along with that, the Law only regulate the quanlititatives rather than quantititatives the levels of environmental degradation, the determination of the degree of deterioration in the function and usefulness of the environment due to the degraded environment. Moreover, the reality shows that, although there are specific instructions in Decree No 03/2015/ND-CP, but the implementation of the determination of environmental damage has not yet been successfully implemented in practice.

Therefore, the LEP in 2020 and Decree No. 08/2022/ND-CP have an important new point that no longer stipulates the determination of damage levels as above. Along with that, the content, mean and method of determining environmental damage are also regulated in a new direction. Determining environmental damage includes the following contents: Determining the scope, area and site of the environment being polluted or degraded; Determining the number of environmental components being degraded, types of ecosystems and species damaged; Determine the damage level of each environmental component, ecosystem and species.

MEANS AND METHODS OF DETERMINING ENVIRONMENTAL DAMAGE

In order to provide specific guidance on determining environmental damage, Decree No. 08/2022/ND-CP stipulates on Data and evidence to determine damage caused by environmental pollution and degradation (Article 116); Means and methods of determining the scope, area and site of the environment being polluted or degraded; quantity of environmental components is reduced, types of ecosystems are damaged, species of animals and plants are killed (Article 117) and means and methods of determining damage level of each environmental component, ecosystems and species (Article 118).

It can be said that, with the new point analyzed above, the determination of the extent of damage is the biggest change and the principle of determining the level of damage is regulated showing a clear direction: not defined according to 3 levels of functional impairment, environmental usefulness is declined, severe declined, particularly severe decline instead, the degree of damage of each environmental component, ecosystem, animal and plant species is determined according to the cost to treat and restore the environment and ecosystem and to breed, conserve, recover and rerelease animals into natural habitats, cultivate plants that meet environmental technical regulations or equal to or equivalent to the original state of the ecosystem and status of animals and plants species before pollution, degradation occurs. Damage to the environment of a geographical area is equal to the sum of damages to each environmental component of that geographical area.

Based on this principle, Decree No. 08/2022/ND-CP has specifically guided the methods of determining the extent of damage in Article 118. Accordingly, depending on each specific case, the competent authority and organizations and individuals that cause environmental pollution and degradation can choose one of the methods to determine the cost of environmental treatment and restoration and raise, conserve, restore and re-release animals into natural habitats and growing plants that meets environmental technical regulations, equal to or equivalent to the initial state of the ecosystem and animal species as follows:

- *Option 1:* Organizations and individuals that cause environmental pollution or degradation shall carry out the treatment, renovation and restoration by themselves.

Organizations and individuals that pollute the environment, degrade the ecosystem and kill animals and plants, by themselves, or hire a unit with appropriate functions and capacity to treat and restore the environment and to cultivate plants, to reared, to preserve, to restore and to release animals into natural habitats, cultivating plants meeting environmental technical regulations, equal to or equivalent to the original state of the ecosystem and species of animals and plants that meet environmental technical regulations or are equal to or equivalent to before the occurrence of pollution or degradation.

In this case, organizations and individuals must pay their own costs to treat and restore the environment and raise, conserve, restore and release animals into natural habitats and grow plants that meets environmental technical regulations, equal to or equivalent to the initial state of the ecosystem and the species of animals and plants within the prescribed time limit, with supervision and certification of results in accordance with the provisions of Law.

- *Option 2:* The competent state agency shall organize the determination of treatment, rehabilitation and restoration costs.

In case organizations or individuals who cause environmental pollution, degradation of ecosystems and death of animals and plants, couldn't do by themself, the competent state agency shall organize the determination of costs for environmental treatment and restoration and breeding, conservation, rehabilitation and release of animals into natural habitats, to cultivate plants meeting environmental technical regulations, equal to or equivalent to the initial state of the ecosystem and animal and plant species according to the formula specified in Clause 4, Article 118 of Decree No. 08/2022/ND-CP.

- *Option 3:* Applying damage calculation results of previous incidents of equivalent scope and nature or simulating the original status quo when it was not polluted or degraded.

In case it is not possible to determine the cost of environmental treatment and restoration up to environmental technical regulations, rearing, conservation, rehabilitation and release of animals into natural habitats, or culturing plants with or equivalent to equivalent to the initial state of the ecosystem and the species of animals and plants, then the results of calculation of damage to the environment, degradation of the ecosystem and the death of animals and plants of previous occurrence of equivalent scope and nature recognized by the competent authority shall be applied; or simulate the current state of the environment when it has not been polluted, the ecosystem when it has not been degraded and the animals and plants that have not died; Make a plan to calculate costs for treatment and restoration of the polluted, degraded environment, ecosystems, animal and plant species in order to return to the original state or equivalent.

- *Option 4:* Another option.

Organizations and individuals that pollute and degrade the environment and ecosystems and cause the death of animals and plants must pay expenses for the treatment and restoration of the environment and plant cultivation. conservation, rehabilitation and release of animals into natural habitats for animals according to options 1, 2, 3.

Thus, the Decree offers a full range of options, including flexibility and feasibility. Option 1 encourages organizations and individuals causing environmental pollution and degradation to carry out the treatment,

renovation and restoration on their own so that they can be proactive and control costs, limit the prolongation of orders and procedures on compensation for environmental damage. However, there are cases where organizations and individuals that cause environmental pollution or degradation could not do it themselves, the competent state agency shall organize the determination of costs for treatment, renovation and restoration of the environment. According to Option 2, the cost calculation formula has also been detailed, easy to understand and more feasible than the calculation formula specified in Decree No. 03/2015/ND-CP. Option 3 is a completely new content, built based on the experience of foreign countries, this option ensures determination of environmetal damage in the case of data and evidence to determine damage caused by pollution and environmental degradation cannot be collected or there has been a change or it is impossible to determine the extent, area and site of the environment polluted or degraded; the number of environmental components is reduced, types of ecosystems are damaged, animals and plants that are killed.

Having many options also helps the competent state agencies to have adequate bases and methods of determining environmental damage; Organizations and individuals that cause environmental pollution or degradation can choose the most suitable plan and limit the most costs and procedures; and according to the actual development and conditions, it is possible to choose another option to be able to do the most suitable determination of environmental damage for each specific case.

Regulations on determination of environmental damage of the LEP in 2020 and Decree No. 08/2022/ND-CP with many important new points as above have been promulgated and taken effect, making an important contribution to improving implementation efficiency of determination of environmental damage and compensation of environmental damage in practice. However, there are still some issues that need further study and consideration:

Firstly, components that are subject to determination of environmental damage regulations as current regulations only meet urgent requirements and practical feasibility, but are not adequate for environmental factors, which can become gaps and reduce deterrence for acts causing damage to environmental factors that have not yet been regulated. Therefore, in the coming time, it is necessary to continue to study international experiences and ways and methods to fully determine environmental damage to all environmental components and environmental factors.

Secondly, norms for treating a unit volume of water, volume or weigh of soil that meet technical regulations on environment, cost of reforestation (on land and mangrove), coral ecosystem, ecological system seagrasses and costs for culturing, breeding, conservation, rehabilitation, release of animals into natural habitats, culturing plants equal to or equivalent to the original state of the animals shall apply norms according to current regulations. However, the norms are not sufficient, so in the coming time, the competent agencies within their responsibilities should review to develop and issue norms for treatment and restoration of environment and ecosystem; breeding, conservation, rehabilitation and release of animals and plants that are still lacking.

Thirdly, in addition, it is necessary to note a number of conditions to ensure the implementation of the determination of environmental damage regulations:

- Completing the organizational structure of the system for dealing with the requirements of the compensation for environmental damage and the determination of environmental damage in accordance with current regulations.

- Enhancing the role of MONRE, local authorities, people's courts at all levels, environmental management agencies, socio-political and professional organizations, businesses and related individuals and organizations in solving the requirements of compensation for environmental damage in general and determination of environmental damage in particular.

- To build and train a contingent of staff involved in the determination of environmental damage or to develop conditions and criteria for selection of units participating in the determination of environmental damage.

- Education and communication to raise awareness for businesses and the community in environmental protection in order to improve the efficiency of solving requirements for compensation for environmental damage in general and determination of environmental damage in particular ■

REFERENCES

1. LEP in 1993, 2005, 2014, 2022.

2. Decree No. 03/2015 /ND-CP regulations on determining damage to the environment.

3. Decree No. 08/2022/ND-CP detailing a number of articles of the LEP.

Proactively adapt to climate change, reduce greenhouse gas emissions following the net zero emissions goal by 2050

On 26th July 2022, the Prime Minister issued Decision No. 896/QĐ-TTg approving the National Strategy for Climate Change (NSCC) until 2050 in order to proactively and effectively adapt to climate change (CC), reduce vulnerability, loss and damage due to CC; reduce greenhouse gas (GHG) emissions following the net zero emissions (NZEs) goal by 2050, make positive and responsible contributions with the international community to protecting the Earth's climate system; take advantage of opportunities from CC response to transform the growth model, improve the resilience and competitiveness of the economy.

Efforts to achieve NZEs goal by 2050

At the 26th UN Climate Change Conference of the Parties (COP26), the Prime Minister stated that Việt Nam will reach its NZEs goal by 2050. Reaching the NZEs by 2050 is the inevitable development goal of the world, realized mainly through strong energy transition, low emission development. Việt Nam's strong commitments and responsible contributions at COP26 have been highly appreciated by the international community and opened up many opportunities for cooperation on low emission growth, promoting circular economy development, adapting to CC. Faced with the trend of CC and the new global context, the response to CC in our country must move to a new stage, which should be placed at the centre, towards the realization of global goal and implemented effectively, substantively and transparently, while promoting the building of a green economy, a circular economy, the NSCC until 2050 is developed to update new international trends as well as clearly orientate urgent and prioritized issues associated with the implementation of the Paris Agreement and commitments of Việt Nam at the COP26 to reach NZEs by 2050.

Accordingly, the Strategy sets out the goal, to proactively and effectively adapt to CC, reduce vulnerability, loss and damage due to CC; reduce GHG emissions following the NZEs goal by 2050, make positive and responsible contributions with the international community to protecting the Earth's climate system; take advantage of opportunities from CC response to trans-

▲ *Clean energy*

form the growth model, improve the resilience and competitiveness of the economy.

Specific objectives include: Reducing vulnerability and risks to CC impacts through improving resilience and adaptive capacity of natural, socio-economic systems and minimizing damage from natural disasters and extreme climate increased due to CC; which set out specific objectives and targets by 2030 and by 2050. Striving to achieve the NZEs goal by 2050, positively and responsibly contributing with the international community to protect the Earth's climate system; improving the growth quality and competitiveness of the economy; in which, setting out specific objectives and targets for each sector by 2030 and by 2050.

By 2030, ensure that the total national GHG emissions are reduced by 43.5% compared to the business as usual (BAU) scenario. In which, the energy sector decreases by 32.6%, the emissions do not exceed 457 million tons of CO_2 equivalent (CO_2eq); the agricultural sector decreases by 43.0%, the emissions do not exceed 64 million tons of CO_2eq; in the forestry sector, the land use reduces emissions by 70% and increases carbon absorption by 20%, with total emissions and absorption reach at least -95 million tons of CO_2eq; the waste sector decreases by 60.7%, the emissions do not exceed 18 million tons of CO_2eq; the industrial processes sector decreases by 38.3%, the emissions do not exceed 86 million tons of CO_2eq. Establishments with annual GHG emissions of 2,000 tons of CO_2eq or more must reduce GHG emissions.

By 2050, ensure that the total national GHG emissions reach the NZEs; the emissions peak in 2035, then decline rapidly. In which, the energy sector decreases by 91.6%, the emissions do not exceed 101 million tons of CO_2eq; the agricultural sector decreases by 63.1%, the emissions do not exceed 56 million tons of CO_2eq; in the forestry sector, the land use reduces emissions by 90%, increases carbon absorption by 30% and total emissions and absorption reach at least - 185 million tons of CO_2eq; the waste sector decreases by 90.7%, the emissions do not exceed 8 million tons of CO_2eq; the industrial processes sector decreases by 84.8%, the emissions do not exceed 20 million tons of CO_2eq. Establishments with annual GHG emissions of 200 tons of CO_2eq or more must reduce GHG emissions.

Some tasks and solutions for implementation

Firstly, proactively adapting to CC: Improve resilience and adaptive capacity of natural, socio-economic systems, ensure sustainable livelihoods. Proactively adapt to CC: (i) The group of tasks to improve resilience and adaptive capacity of natural, socio-economic systems and ensure sustainable livelihoods includes: Preventing impairment, degradation and restoring natural resources; Developing agriculture and ensuring food security; Managing and protecting forests and ecosystems; Developing infrastructure to adapt to CC; Developing medical and health care services; Ensuring social security and gender equality; (ii) The group of tasks and solutions to reduce damage caused by natural disasters and increased extreme climate caused by CC includes: Forecasting and early warning; Developing natural disaster prevention works; Ensuring the safety of people's lives and properties against the impacts of CC.

Secondly, on GHG emissions reduction: Including general tasks on GHG emissions reduction and GHG emissions reduction by sectors: energy; agriculture; forestry and land use; waste; industrial processes and industrial product use, in which a roadmap has been set out with the subjects of GHG inventory and GHG emissions reduction to 2050. The implementation of GHG emissions reduction in daily activities has gradually become a matter of business ethics and social responsibility of organizations and businesses.

Thirdly, on perfecting institutions, promoting potentials and resources to effectively respond to CC, including: Developing and perfecting mechanisms, policies and legislation on CC in line with objectives of the Strategy; Communicating, raising awareness and engaging the community in responding to CC; Developing human resources; Implementing scientific research and technological development; Mobilizing financial resources for CC response; Promoting international cooperation and climate diplomacy.

Fourthly, capital sources to implement the Strategy: Capital sources from the state budget, capital of organizations and individuals, international funding and other lawfully mobilized capital sources as prescribed by Law ■

THANH HƯƠNG

Drastic fall in global wildlife populations

▲ *A jaguar in the Pantanal, Brazil*

The world's wildlife populations have declined by more than two-thirds since 1970 as forests have been cleared and oceans polluted, according to a newly released report. The World Wildlife Fund (WWF) report, which used 2018 data from Zoological Society of London on the status of 32,000 wildlife populations covering more than 5,000 species, found that population sizes had declined by 69% on average. Deforestation, human exploitation, pollution and climate change were the biggest drivers of the loss.

Wildlife populations in Latin American and the Caribbean were hit especially hard, experiencing a 94% drop in just five decades. One population of pink river dolphins in the Brazilian Amazon plummeted by 65% between 1994 and 2016, the report said. The report has also stated that Africa recorded a 66 per cent fall in its wildlife populations from 1970 - 2018 and the Asia Pacific saw a 55 percent decline. Its findings were broadly similar to those in WWF's last assessment in 2020, with wildlife population sizes continuing to decline at a rate of about 2.5% per year. The WWF identified six key threats to biodiversity which include agriculture, hunting, logging, pollution, invasive species and climate change - to highlight "threat hotspots" for terrestrial vertebrates.

According to the International Union for Conservation of Nature (IUCN) Red List, cycads are the most threatened species, while corals are declining the fastest, followed by amphibians. Habitat loss and barriers to migration routes are responsible for about half of the threats to monitored migratory fish species.

According to a report in DownToEarth (a magazine of India), Director-General of WWF International Marco Lambertini said, "we face the double emergencies of human-induced climate change and biodiversity loss, threatening the well-being of current and future generations. A nature-positive future needs transformative, game-changing shifts in how we produce, how we consume, how we govern and what we finance". Unless we stop treating these emergencies as two separate issues, neither problem will be addressed effectively.

However, the report offered some glimmers of hope. While the eastern lowland gorilla population in the Democratic Republic of the Congo's Kahuzi-Biega National Park fell by 80% between 1994 and 2019 due to bushmeat hunting, the mountain gorilla population near Virunga National Park increased from around 400 individuals in 2010 to over 600 by 2018.

Still, the wide-ranging declines have prompted desperate pleas for increased support for nature. Efforts need to be made by global organizations and Governments to mitigate the impact of climate change and focus on balanced development that gives equal importance to all forms of life on the planet.

In December 2022, delegates from around the world will gather in Montreal to hash out a new global strategy to protect the world's plants and animals. One of the biggest asks is likely to be increased financing for global conservation efforts. "We are calling on the rich nations to provide financial support to us to protect our nature", said WWF's Regional Director for Africa Alice Ruhweza ■

AN VI

Việt Nam to improve environmental quality

Although pollution, solid and hazardous waste management has been strictly implemented and nature and biodiversity conservation has been enhanced, Việt Nam's environmental sector still has shortcomings and limitations, according to experts.

Violations

A recent report by the Ministry of Public Security said that climate change has become more complicated in recent years. The pressure of socio-economic development and violations of laws related to environment, natural resources and food hygiene and safety have made the quality of the environment continue to be severely affected. From 2016 to June this year, the police detected 156,328 violations by 173,010 people. As a result, the police prosecuted 2,129 cases with 3,147 people and given administrative violations for 142,908 cases with 149,459 people. The amount of administrative fine is over VNĐ 1.9 trillion (US$ 83.3 million).

At the fifth National Environment Conference organized on 4th August 2022, Deputy Prime Minister Lê Văn Thành said that environmental pollution in some places is at risk of exceeding the threshold. This would impact socio-economic life and people's health.

Biodiversity in decline

The root cause is that awareness of some Party committees, authorities, organizations and people about environmental protection is not complete, not yet transformed into specific awareness and actions. Attaching importance to immediate economic benefits and ignoring environmental protection is still common. Violations of the Law on Environmental Protection are increasingly sophisticated and severe. In contrast, State management agencies in environmental protection are still limited.

Furthermore, infrastructure and technology for environmental treatment have not kept pace with environmental protection requirements. Minister of Natural Resources and Environment Trần Hồng Hà also said that although the environment quality has improved, it is happening too slowly. The environment in some places continues to be polluted, especially in river basins and craft villages. The unreasonable and unsustainable exploitation of natural resources continues to lead to resource loss and negative environmental impacts. Deforestation, illegal hunting, the trade of wild animals and plants and invasive alien organisms are problematic. Increasing urbanization and large cities also lead to many pollution risks from economic development activities and pressures of climate change.

Minister Trần Hồng Hà said that if the country had not found solutions to control and handle in time, it would greatly impact sustainable development goals.

▲ *Volunteers in Đà Nẵng City rowing a boat to collect trash on the Hàn Rivier*

"Environmental city"

Đà Nẵng is a typical city when it comes to environmental protection. To build Đà Nẵng into an "environmental city", the City has achieved many outstanding environmental titles such as "one of the 11 environmentally sustainable cities of the region in 2011" (voted by the ASEAN) and "cities with clean air and low carbon emissions in 2012". The Ministry of Natural Resources and Environment (MONRE) has recognized Đà Nẵng as "one of the five cities with a good level of environmental protection in 2020".

During the 2016 - 2021 period, Đà Nẵng City achieved many impressive environmental protection indicators; all urban and rural households are provided with clean water and sanitation and 88.2 percent of urban wastewater is collected and treated up to environmental standards. More than 90 percent of hospitals and medical centers have wastewater treatment systems meeting environmental standards. All industrial zones have standard wastewater treatment systems. As much as 95 percent of solid waste in urban areas is collected and treated. Daily-life solid waste landfills ensure hygienic standards. All people's feedback and recommendations on environmental pollution through the City's hotline are handled. To achieve the result, education about environmental protection was carried out very early with the initiative and active participation of local authorities, organizations and individuals.

Trà Vinh Province is another good example. While approving projects, the province prioritizes clean and environmentally friendly technologies and not approving investment projects with potential environmental risks. The Province has also issued policies and solutions to manage and protect the environment. The Province's report announced at the fifth National Environment Conference showed that in 2016 - 2021, the Province organized 48 training courses on environmental protection, seven training courses on environmental protection in the petroleum business, delivered 860 trash cans to districts, implemented six environmental protection models in residential areas, gave 1,100 trash cans for people to separate waste at home and published 3,500 books for environmental protection and climate change response. The Province organized more than 84,255 environmental sanitation campaigns with more than three million attendees, set up 393 "green-clean-beautiful" roads with a total length of 750km and established more than 4,200 environmental clubs.

Strong action

The National Strategy for Environmental Protection to 2030 with a vision to 2050, approved by Prime Minister Phạm Minh Chính on April 13th 2022, set a target that by 2030, Việt Nam's environment will be of good quality, ensuring people's right to live in a healthy and safe environment. To develop the country in a sustainable direction, and one of the three pillars is environmental protection, Deputy Prime Minister Lê Văn Thành said that in 2022 - 2025 and the following years, the environment industry needed to have strong action.

It needed transformation in thinking, awareness of a sustainable lifestyle in harmony with nature and resolving the relationship between economic development and environmental protection.

The MONRE targets that by 2025, 90 percent of urban daily-life solid waste, 80 percent of rural-life solid waste and 95 percent of hazardous waste will be collected and treated based on a standard. Over 30 percent of urban wastewater will be treated up to standards. Thirty percent of areas with serious soil environmental pollution are treated, rehabilitated and restored. The days with a good and average air quality index (AQI) in urban areas remain at 70 - 75 percent. It will ensure that 92 percent of industrial and export processing zones have a centralized wastewater treatment system meeting environmental standards. All industrial zones, businesses and service establishments will install automatic wastewater and emission monitoring systems and transmit data directly to the local department of natural resources and environment.

The country strives that by 2025, the area of nature reserves will reach 2.7 million hectares. In addition, the area of marine and coastal conservation zones will reach 1.5 - 2 percent of the total national sea area. In those works, each individual's role is especially important as Prime Minister Phạm Minh Chính said, "this is a global issue, so a global approach is required. This issue affects everyone so we should have a people-wide approach" ■

VŨ NHUNG

Here's how five countries are reviving biodiversity

In everywhere from snowy Boreal forests to coral-studded Pacific coastlines, national parks, protected areas and traditional approaches are critical to conserving biodiversity. But shielding pristine habitats and endangered species is no longer enough to halt the rapid loss of nature. That is why Governments and experts are urgently preparing a comprehensive new global framework for biodiversity. Amid a raft of measures, including more protection, the framework is expected to include a drive to restore ecosystems of all kinds around the world.

Restoration is already on the rise since last year's launch of the United Nations Decade on Ecosystem Restoration. Both the UN Decade and the new biodiversity framework will run through 2030. The mutual benefits of conservation and restoration are already becoming clear. Here are five restoration initiatives showing how reviving ecosystems, conserving biodiversity and building a sustainable future go hand-in-hand.

GRASSLANDS BUZZING WITH LIFE IN CANADA

A restoration project in Ontario (Canada) is creating and enhancing more than 1,500 hectares of grassland ecosystems. The Grassland Stewardship Initiative aims to protect and recover threatened bird species, including bobolinks and meadowlarks, while improving the quality of the soil and its ability to capture carbon.

▲ *A bobolink*

GREENING FARMS ACROSS ZAMBIA

Agroforestry systems, which combine crops with trees, support biodiversity. Now hundreds of small farmers in Zambia's Copperbelt Province are receiving training and tools in return for letting indigenous trees grow on their land. The WeForest project provides families with better and more diversified livelihoods, such as beekeeping, which cuts their dependence on the charcoal business degrading local miombo woodlands.

▲ *Hundreds of farmers in Zambia's Copperbelt Province are receiving training and tools in return for growing indigenous trees*

URBAN PARKS FLOURISHING IN SCOTLAND

With 80 percent of the global population expected to live in cities by 2050, the need to preserve, restore and create urban spaces for nature is urgent. A project in Glasgow, Scotland uses exhibits exploring 10,000 years of local history to entice visitors to the restored Seven Lochs Wetland Park. The 16km^2 Park aims to promote the heritage and well-being of local communities and become a haven for wildlife, from deer to damselflies.

HOPE SPRINGS FOR CORAL REEFS IN BELIZE

Coral reefs are biodiversity hotspots, food banks, storm barriers and tourist magnets all in one. To offset the damage from coral bleaching events, the Fragments of Hope project in Southern Belize is regenerating its barrier reefs with species that can be resilient in the face of climate change. The initiative promotes the sustainable management of coastal habitats so the natural wonders that draw visitors and support local livelihoods can have a long-term future. How you can help: For your next vacation or outing in the sea, check your sunscreen for the coral-friendly label, make sure you stay in designated areas and don't forget to collect and sort your waste.

▲ *Coral reefs are biodiversity hotspots*

▲ *Orangutans are protected in Sebangau National Park, Borneo*

REGENERATING PEATLANDS IN BORNEO

Tropical peatland fires eliminate biodiversity while pumping vast quantities of climate-altering carbon into the atmosphere. Sebangau National Park in Borneo is home to clouded leopards, sun-bears and the world's largest protected population of orangutans. To prevent fires here, the Borneo Nature Foundation is empowering communities to restore burnt peatlands by planting one million native trees and blocking drainage channels ■

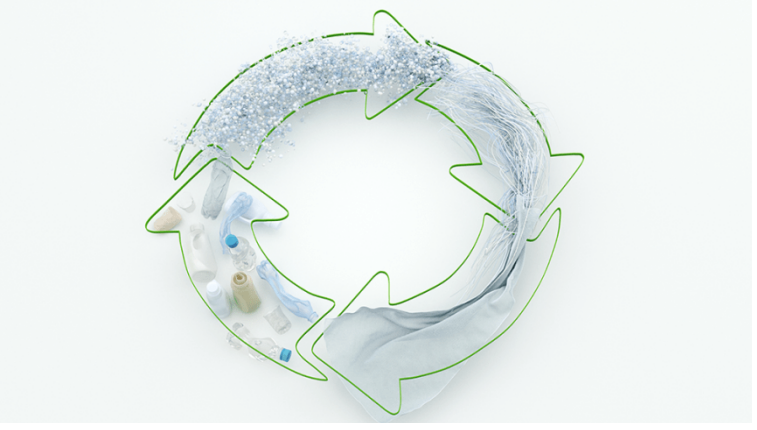
PHƯƠNG LINH

Plastic recycling hits record high in 2021

Intellectual Property Firm Mathys and Squire has reported that 2,149 patents for plastic recycling were filed last year, indicating a record high, up seven percent from 2021 and an eightfold increase since 2016.

The global plastics recycling market size was USD 38.52 billion in 2021 and is expected to register a revenue CAGR of 6.57% during the forecast period. Plastics recycling market revenue growth is primarily driven by factors such as rising demand for eco-friendly and sustainable products and increasing demand from manufacturers owing to its cost-effectiveness. In addition, rising investments in research and development activities is also driving growth of the market.

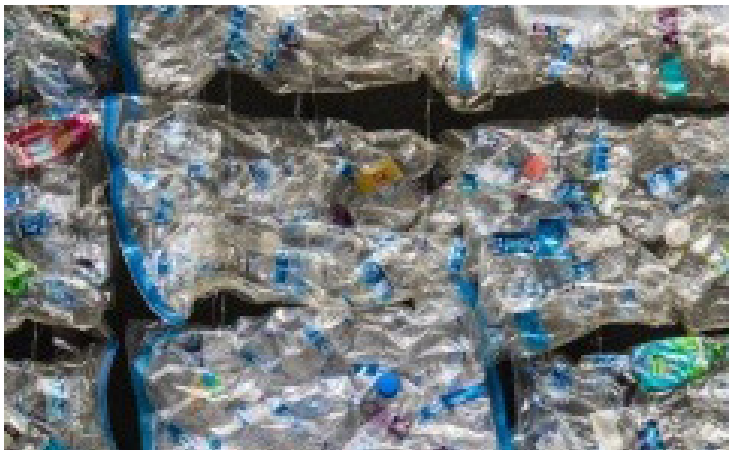
Plastic recovery and recycling technologies have enormous economic value. Recycled plastic can be used as a raw material for making other materials and also has lower-environmental-footprint than other virgin materials. Market revenue growth is also driven by increasing technological advancements in sustainable technologies and development of innovative methods of plastic recycling and segregation. Stakeholders are increasingly demanding low-carbon products, which in turn is creating a huge market for recycled plastics. Whoever can develop a cost-effective method of producing clear recycled plastic will be able to tap into what some major players estimate to be a potential £ billions market.



▲ *A record 2,149 patents for plastic recycling were filed (2021)*

As a result of this demand, a vast range of methods for separating and sorting clear recycled PET are being tested. PET is short for polyethylene terephthalate, the chemical name for polyester. PET is a clear, strong and lightweight plastic that is widely used for packaging foods and beverages, especially convenience-sized soft drinks, juices and water. It is also popular for packaging salad dressings, peanut butter, cooking oils, mouthwash, shampoo, liquid hand soap, window cleaner, even tennis balls. Special grades of PET are used for carry-home food containers and prepared food trays that can be warmed in the oven or microwave. The main priority is to achieve a higher quality "feed" of recycled plastic that will provide the desired lack of color.

85 million tons of PET plastic are produced globally per year. Mathys and Squire says that given the pressures on corporates to use more recycled PET, the Company that perfects clear recycled plastic stands to generate very large revenues from licensing its technology. Coca-Cola and Pepsi have each pledged to use at least 50% recycled PET by 2030.



▲ *Competition to develop technology that will produce clear recycled plastic is prevalent within the plastic recycling industry*

Mr. Chris Hamer, Partner at Mathys and Squire said: "The race is on to develop the holy grail of cost-effective, clear recycled PET. That is the key driver behind the surge in innovation we have seen in this area".

China is leading the way in patent filings as the country is in the middle of a single-use plastic crackdown. In July of 2021, China's National Development and Reform Commission which oversees economic planning of mainland China published a five-year plan to boost plastic recycling and incineration capabilities. The five-year plan also commits to greatly reducing the use of single-use plastics. Last year, Chinese companies filed 1,970 patents relating to plastic recycling, 1,937 more than second place India ■

NAM VIỆT

Applying the eco-industrial park model towards sustainable development in Việt Nam

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The birth of eco-industrial parks (EIPs) has partly overcome the disadvantages of traditional industrial parks (IPs) towards sustainable development. Industrial zones play a very important role in promoting industrialization in most countries in the world, especially developing countries, including Việt Nam.

CURRENT STATUS OF IP DEVELOPMENT

In recent years, the rapid development of industrial zones has brought many economic benefits. However, the concentration of industrial enterprises in a certain area has increased pressure on the environment. Moreover, the inefficient use, waste of resources as well as non-circulation and reuse of ordinary waste causes an increase in treatment costs of enterprises and limits the connection among industrial enterprises in the IP.

Currently, Việt Nam has about 400 industrial zones established, of which nearly 300 industrial zones have been put into operation with an occupancy rate of about 70%. Vietnam's industrial zone system has attracted over 10,000 domestic projects and nearly 11,000 valid foreign direct investment (FDI) projects, with a total registered investment capital of about 340 billion USD (of which, the total FDI investment capital is about 230 billion USD), accounting for 50% of the total investment capital of the whole society.

Traditional industrial zones have contributed positively to Vietnam's industrial and export growth. In 2015, industrial zones contributed 38% of the country's industrial production value, by the end of 2020, this figure will be 60%. In particular, with the investment of many large corporations in the world such as Samsung, Intel…, industrial zones have significantly contributed to export growth, economic growth and job creation for workers. In addition to the positive aspects, the rapid and "hot" development of industrial zones is causing an increase in the rate of hazardous waste, accompanied by water pollution, air pollution, threatening the health of people living around the IP.

▲ *The industrial-urban symbiosis model is being studied and built in Deep C Industrial Park (Đình Vũ, Hải Phòng City)*

Meanwhile, according to the general assessment of experts, the current traditional IP lacks the linkage to increase competitiveness. The enterprises themselves operating in the industrial zone cannot take advantage of each other to develop production and business effectively; have not yet reduced costs and taken advantage of available resources.

With the trend of greening the economy, many foreign investors are considering EIPs as one of the important criteria for choosing to locate their factories. This is also understandable because in EIPs, output products of one enterprise can become input products of another enterprise and vice versa. As a result, businesses significantly save operating costs and improve competitiveness. The EIPs model is the creation of resource and cost-effective IP, which are more competitive and attractive and more resistant to higher risks. Then, manufacturing and service enterprises that use and share resources together seek opportunities to improve environmental, socio-economic efficiency through cooperation in environmental management.

Facing negative impacts on the environment and community, Decree No. 82/2019/ND-CP of the Government stipulating the management of industrial zones and economic zones, most recently Decree No. 35/2022/ND-CP was issued, stating: An EIPs is an IP in which enterprises in the IP participate in cleaner production activities and the efficient use of resources and have linkages and cooperation in production to ensure at least one industrial symbiosis will be recognized as an eco-enterprise (Decree No. 35/2022/ND-CP, Article 40, Clause 2).

APPLICATION OF EFFICIENT USE OF RESOURCES - CLEANER PRODUCTION IN ENTERPRISES IN INDUSTRIAL ZONES

In order to overcome the shortcomings of traditional IPs towards green growth, from 2015 - 2019, the Ministry of Planning and Investment coordinated with the United Nations Industrial Development Organization (UNIDO) to implement the project "Deploying the EIP initiative towards a sustainable IP model in Việt Nam" (EIP) piloted the transformation of traditional industrial zones into EIPs in 4 industrial zones including: Trà Nóc 1 and 2 IP (Cần Thơ), Hòa Khánh IP (Đà Nẵng), Khánh Phú and Gián Khẩu IP (Ninh Bình).

Whith funding from the Global Environment Facility (GEF), the Swiss State Secretariat for Economic Affairs, through technical support from Vietnam Cleaner Production Center Co., Ltd. (VNCPC), 72 enterprises participating in projects in industrial zones have been consulted on solutions for Resource Efficient and Cleaner Production (RECP) in order to make the most of input materials, use energy efficiently, save water as well safe use of chemicals and management of wastewater and waste... After 5 years of implementation, thanks to the application of RECP solutions, these enterprises have saved up to 6.5 million USD/year. The project has also conducted training for more than 3,100 managers and technicians on EIPs.

At the end of the EIP project, 72 participating enterprises applied RECP solutions and saved 22,000 MWh of electricity; over 600,000m^3 of clean water; more than 140 TJ of fossil fuels and nearly 3,600 tons of chemicals and waste. These solutions have also resulted in a reduction of 32 Kt of CO_2 annually.

With the success of the EIP project, SECO and UNIDO continue to support Việt Nam to implement the project "Deploying EIPs in Việt Nam in the direction of the Global EIP Program" deployed in 3 IPs including: Amata IP (Biên Hòa City, Đồng Nai Province); Đình Vũ IP (Hải Phòng City); Hiệp Phước IP (Hồ Chí Minh City). The project will select 20 enterprises in Deep C IP (Đình Vũ, Hải Phòng); 20 enterprises in Amata IP; 40 enterprises in Hiệp Phước IP to support RECP assessment. Thereby, the project will uncover industrial and urban symbiosis opportunities for detailed study and implementation support. Preliminary results of implementation at 41 enterprises show that:

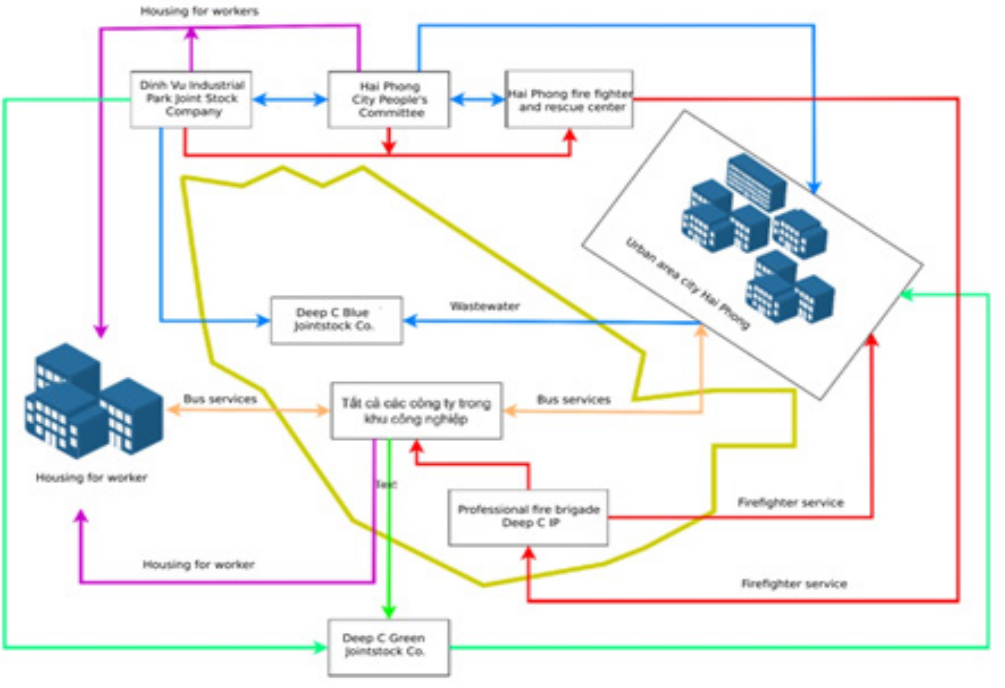
Total number of RECP solutions suggested: 196.

Reducing greenhouse gas emissions: 55,211 tons of CO_2 equivalent/year.

Total savings potential: 151.44 billion VND.

Reduce consumption: Electricity: 64,195 MWh/year; Water: 77,896 m^3/year; Oil DO: 33.6 tons/year; LPG: 132.1 tons/year.

** (Source: Preliminary report on implementation results of VNCPC's Project component at the Conference "Deploying EIPs in Việt Nam in the direction of the Global EIP Program" on September 15th, 2022, in Hồ Chí Minh City).*



▲ *Amata IP (Biên Hòa City, Đồng Nai Province)*

INDUSTRIAL - URBAN SYMBIOSIS

One of the criteria of an EIP is to form at least one solution on industrial and urban symbiosis. In which industrial symbiosis is the sharing and utilization of resources and waste among enterprises in industrial zones, urban symbiosis is the formation of linkages, utilization and sharing of resources and infrastructure of industrial zones with neighboring residential and urban areas. Urban symbiosis models are proposed to be studied for industrial zones with surrounding population and urban areas within the framework of the project, including: Connecting bus infrastructure to transport workers from surrounding residential areas to IPs; Building social housing for tenants to work with peace of mind; Vocational training for residents in the vicinity of the IP, connecting and sharing recruitment information; share firefighting infrastructure with residential areas when there is a fire; cconnecting domestic wastewater from residential areas for treatment at centralized waste-water treatment stations of the industrial zone; uutilize standard waste-water to irrigate plants for industrial zones and neighboring urban areas.

Successfully building an industrial-urban symbiosis solution will contribute to reducing resource waste, infrastructure risks, cutting costs and promoting sustainable growth not only for enterprises and industrial zones but also create linkages between enterprises and IPs which closely connected with the surrounding community. The benefits of symbiosis can be direct or indirect, it goes beyond the traditional business framework and towards greater benefits than improving the quality of water, air and living environment.

RECOMMENDATIONS

The implementation of converting industrial zones into EIPs is an inevitable trend and brings many socio-economic and environmental benefits. However, the implementation still has many problems for both enterprises, IP management infrastructure companies as well as relevant agencies. One of the reasons is: (1) Enterprises still lack information about their benefits, how to implement industrial symbiosis solutions and effectively use cleaner production resources to transform into ecological enterprises and EIPs, so they are not ready to cooperate and participate in implementation; (2) Access to loans for enterprises to invest in green and environmentally friendly technology transformation is very limited and requires many procedures and time. This leads to difficulties in implementing and maintaining resource efficient solutions, cleaner production. At the same time, it creates a challenge for monitoring the total energy, resources consumed and waste generated for the whole IP; (3) Many regulations and guidelines on recycling and reuse of waste are unclear and inconsistent, making it difficult for enterprises to implement ■

Nam Cầu Kiền Industrial Park is determined to build a sustainable industrial symbiotic ecosystem

Recently, in New Delhi (India), the World Records Union (WRU) organized the "4th World Record Holders Meet". The program has the participation of many new World and Asian Records and noble titles for Việt Nam's Record Holders. Here, Mr. Phạm Hồng Điệp - Chairman of Shinec Joint Stock Company (Investor of Nam Cầu Kiền Eco-Industrial Park project, Thủy Nguyên District, Hải Phòng City) was honoured to receive the title of Honorary Doctor of the WRU, under the WRU (Worldkings) with the research and implementation of topics that won many national awards in the field of environmental protection to apply in building the eco-industrial park (EIP) model in Việt Nam.

On the occasion of Vietnamese Entrepreneurs' Day on 13th October 2022, Environment Magazine had an interview with Mr. Phạm Hồng Điệp about efforts to research and pioneer in building an EIP model in Hải Phòng City.

• **Reporter:** *Congratulations to you on the honour of receiving the title of Honorary Doctor from the WRU. What does this title mean to you and Shinec Joint Stock Company?*

Mr. Phạm Hồng Điệp: Receiving the title of Honorary Doctor from the WRU is a great honour for me and Shinec Joint Stock Company, that is a testament to the process of me personally and Shinec's team working continuously, creatively, seriously, scientifically and excitedly to create a scientific work from theory to practice objectively applying production reality to a model of building a circular economy in an EIP. This is the first EIP in Việt Nam invested by Vietnamese people. Obviously, it is very difficult for any scientific work to solve in parallel both problems of theory and immediate application to a practical model, so this is the pride of both Shinec and the community of investors in Nam Cầu Kiền Industrial Park (IP). We are a united group with a symbiotic economic relationship that brings added value to the business itself, developing sustainably and closely associated with environmental protection in accordance with the direction of the Party and the State.

• **Reporter:** *Obviously that during the past years, you have devoted a lot of enthusiasm to researching and implementing solutions in the field of environment, so can you review typical projects/solutions that bring high value when applied in practice?*

Mr. Phạm Hồng Điệp: As a businessman, I always raise my awareness of economic development closely associated with environmental protection, specifically since 2005 until now, I have had 7 highly awarded topics on environmental protection creatively from practical labour and production activities such as: Planting forest trees to protect the environment by applying the traditional culture of each locality; Developing an Innovation Fund for sustainable environment; Developing industrial parks in harmony with environmental protection in combination with rural security; Treating domestic waste in rural areas, developing green residential areas; Developing circular economy in EIPs from theory to practice; Researching solutions to build a solar power system towards carbon neutrality applied in Nam Cầu Kiền IP... All the above topics are developed from production and practical application to develop into scientific topics. Through these topics, I am personally honoured to receive many noble awards on the environment, especially in 2014, I received the Special Vietnamese Talent Award in the field of environment.

▲ *Mr. Phạm Hồng Điệp - Chairman of Shinec Joint Stock Company (left) was honoured to receive an Honorary Doctor from the WRU*

• **Reporter:** *As a pioneer enterprise in the development of Nam Cầu Kiền IP, in the process of operation, what advantages and difficulties have you encountered?*

Mr. Phạm Hồng Điệp: In fact, in embarking on the construction of IP infrastructure, we have experienced many difficulties and advantages as "emotions over the years". It is hard work, constant creativity and having to overcome hardships until success brings great happiness. Therefore, I personally think that these are the "music" of life's ups and downs, so it is necessary to poetize it to become a good "music" in the process of successfully building an EIP model.

• **Reporter:** *Recently, at the Workshop themed "EIP development in Việt Nam: Institutional framework and implementation" organized by the Ministry of Planning and Investment, you gave a presentation on the transformation process under the EIP model towards carbon neutrality. So, can you share the experience that Nam Cầu Kiền IP transformed to an EIP model?*

Mr. Phạm Hồng Điệp: To transform from a general IP to an EIP is a difficult problem, from the legal base to calling for investment and building a system of ecological enterprises symbiotically in the IP; calling on investors to share the same will to build green businesses, to build an advanced management system applying information technology, to propagate consistent knowledge from the investors to the employees in each factory, multi-level community activities. Accordingly, from investors, managers of enterprises, specialized engineers, workers to all have a common awareness of environmental protection, change behaviour in production and business and apply advanced technology... a lot of work so far, we have succeeded in building an industrial ecosystem. We still have a lot of work to do to perfect the ecological model in the true sense and the investor community in Nam Cầu Kiền IP is determined to unite to build an industrial symbiotic ecosystem in a sustainable way, although there are still many difficulties ahead.

• **Reporter:** *In order to effectively implement the EIP model in Việt Nam in general and in Nam Cầu Kiền IP in particular, what suggestions and recommendations do you have for the authorities?*

Mr. Phạm Hồng Điệp: The common difficulty at present that enterprises face is that our legal system is not synchronized, still in the process of revision and adjustment, this is a big obstacle. However, state management

▲ *Overview of Nam Cầu Kiền EIP (Hải Phòng) invested by the Shinec Joint Stock Company*

agencies are actively developing laws and sub-law documents to help Việt Nam's economy integrate with the world economy and achieve its commitments in COP26 that the Government signed with the world.

• **Reporter:** *The Law on Environmental Protection (LEP) in 2020 has many new points to promote the role of people, businesses... in participating in environmental protection activities, as the investor Iinvestor of the IP, do you have plan to propagate and disseminate the Law to businesses and employees to bring the Law to life soon?*

Mr. Phạm Hồng Điệp: The LEP 2020 is a radical law that opens a wide corridor covering Vietnamese social life, regulating environmental protection issues. In order to clarify the provisions of the Law and inspire the young generation, Nam Cầu Kiền IP has established the Center for Innovation and Environmental Communications. Over the years, we have regularly welcomed students, CEO and CFO classes, Master of Business Administration classes from universities in the North for practical learning and model visits, thereby propagating the legislation on environmental protection and bringing economic knowledge to those who come to the IP. At the same time, the Centre also organizes on-site training sessions for officials and workers in the IP. I also open an online column to answer about the legislation through the YouTube channel… with the hope that everyone will update and raise awareness about environmental protection to change behaviour in life in a positive way to improve the quality of our own life and make Việt Nam as the safe and friendly destination of the world...

• **Reporter:** *Thank you very much!*

NAM HƯNG

Beverage cartons are the focus of a new initiative run by Circular Action (CA) a BV Rio Group Company, in partnership with Tetra Pak and Packaging Recycling Organization Vietnam (PRO Vietnam). The pilot project intends to provide a recycling solution and deliver additional income to around 200 informal waste pickers.

The pilot project will take place in Hồ Chí Minh City (HCMC) until March 2023 and for the first time, the recycling activities are being run with the cooperation of beverage and food manufacturers in the PRO Vietnam alliance and a digital solution from CA, the KOLEKT App, is being used to manage carton collection. "Promoting the collection of used beverage cartons for recycling has always been at the core of Tetra Pak's sustainable development. By doing this, we aim to realize our promise to protect what's good, including protecting food, protecting people and protecting the planet", said Mr. Eliseo Barcas, Managing Director of Tetra Pak Vietnam.

The project follows on from a feasibility study BV Rio conducted for Tetra Pak in 2020 looking at strategies for the collection and recycling of used beverage cartons in both Việt Nam and India. The study found that informal waste pickers are crucial to carton collection programs, and that a project design that neglects informal collectors could potentially destroy their jobs. With CA's mobile app, developed with waste pickers in Indonesia, CA designed this pilot CA Program (CAP) to manage the recovery and recycling of 3,000 tons of used beverage cartons in HCMC.

In order to deliver social, as well as environmental, benefit, PRO Vietnam is providing additional incentives to aggregators and recyclers to process the cartons, a benefit passed onto waste pickers through higher prices paid for collected materials. In fact, beverage cartons, like those made by Tetra Pak, were not automatically collected by informal waste pickers until now.

Mr. Phạm Phú Ngọc Trai, Chairman of PRO Vietnam said: "We appreciate the initiative, the model and the effectiveness of the collection for recycling of Used Beverage Carton (UBC) projects from Tetra Pak - one of our core members. Hence, we would like to collaborate to execute this pilot project with the expectation to open a new model in collection for recycling of UBC - a material that faced a lot of challenges in collection,

Carton recycling initiative begins in Việt Nam

▲ *A new carton recycling initiative aims to collect and fully recycle 3,000 tons of used drink cartons into new products*

supporting the informal sector playing in this value chain and promoting the circular economy in Việt Nam. "We believe that the pilot project will be successful and serve as a foundation to increase carton collection and recycling in the coming years. Besides, we will also utilise this initiative as a typical example to apply the collection for recycling of other packaging materials. This will be our flagship project, reconfirm our commitment in execution of Extended Producer Responsibility (EPR) - which will be effective in early 2024. PRO VN believes, together, we will make our Việt Nam Green - Clean - Beautiful".

A CAP is a customized service based on engaging all actors in the waste supply chain and providing incentives for collection, sorting and recycling of waste materials. The system is managed using supply chain traceability and monitoring tools (the KOLEKT app and reporting platforms) for the Program to register all actors participating in waste management supply chains to enable the traceability of waste along the supply chain. The Program will start by paying larger waste collection centers an incentive fee for all tons of Tetra Pak cartons sold to paper recycler Đồng Tiến Paper, to be recycled into brown paper and into chipboard or corrugated roofing. The large collection centers (or waste aggregators) receiving a performance-based payment per kg sold, will pass on the bonus to waste pickers in order to secure supply. Tetra Pak cartons are usually not collected at all and so this new recycling opportunity is providing vital additional income for the waste pickers. In early 2022, Tetra Pak announced an investment worth 1.2 million EUR (over 1.19 million USD) to expand the beverage carton recycling capacity at Đồng Tiến Paper Factory from 9,000 tons per year to 17,000 tons per year. The installation of the machines is expected to complete in early 2023 for the project to begin in the second quarter of the same year.

The project is being overseen by the new CA team in Việt Nam by Project Manager John Murphy and Project Coordinator Trần Ngọc Trân and CA Director Thierry Sanders, based in the Netherlands. Mr. Thierry Sanders said: "This project has the potential to be transformational for all involved. This project brings a triple-dividend of firstly preventing waste going to landfills or nature. Then it increases the incomes of waste pickers and finally creates cooperation throughout the supply chain. Tetra Pak is the perfect partner willing to pilot this innovative way of working, involving mobile technology. PRO Vietnam now has the method to grow waste collection across Việt Nam for the decades to come" ■

ĐỖ HOÀNG

New AI model detects and categorizes marine plastic

A new artificial intelligence (AI) model, able to recognize and classify different types of marine plastic in images shot by a video camera, has been pioneered by a team of scientists at Plymouth Marine Laboratory (PML). Using a "low-cost camera" mounted on the side of a boat, the model is able to categorize the presence or absence of plastic in an image with an accuracy of 95 percent. It is also capable of differentiating different types of plastic, for instance, a plastic bag or bottle, with an accuracy of 68 percent.

Researchers Sophie Armitage and Dr. Dan Clewley at PML told Resource that the model was initially trained to be able to recognize three types of plastics: bags, plastic bottles and buoys. These classes of plastics were chosen by the scientists as they are commonly found, but the model can now be trained to recognize other types of debris. The AI works best when plastic is floating on the surface, although PML says that the AI still recognized a plastic bag when "partially submerged".

Footage is run through PML's "high performance computer" - the MAGEO supercomputer (Massive GPU Cluster for Earth Observation), which is based at the lab and operated by the Natural Environment Research Council Earth Observation Data Acquisition and Analysis Service. The low-cost nature of the camera means that the method can easily be used worldwide by boat owners, "citizen scientists" and other researchers.

Different types of plastic often come from different sources, behaving differently in the water in terms of how they degrade. Understanding the characteristics of these different types, helps provide more information to better understand the problem. Plastic waste plays a large role in the global pollution crisis, affecting marine organisms and ecosystems and threatening human health. Monitoring marine plastic, assists in the mitigation of plastic, an often-challenging task due to the "scale, complexity and time required to do so manually". The researchers expect the new method to "greatly support efforts to clean up our seas", potentially through the technology's ability to identify "hotspots" of marine litter and enable an improved understanding of how floating plastics travel in the water.

The technology could be attached to crewed or autonomous vessels, such as PML's proposed long-range autonomous research vessel, the Oceanus. For now, PML would "like to continue refining the algorithm", collecting data from a wide range of areas and in different conditions. The lab intends on using the information collected to "help develop and validate methods for detecting plastic from satellite data", providing a "better picture of where plastic is ending up in the ocean and where it could be coming from". Ultimately, this could help with clean-up efforts while providing "valuable evidence to inform policymakers".

Dr. Victor Martinez Vicente, Senior Scientist at PML commented: "In situation harmonized and simplified observations of floating marine plastic debris are currently very limited in the literature. We have aimed to tackle the scarcity of these observations through our research on low-cost automated observations. We hope that this initial step will lead to an increase of in situ observations everywhere, but especially in poorer countries where marine litter is usually a great problem. With the increase of these observations, we expect to support the validation of algorithms from current sensors and the development of future satellite missions. Properly validated satellite algorithms will allow us to use remote sensing techniques to monitor the progress towards sustainable development goals at global scale" ■

HOÀNG ĐÀN

▲ *The AI works best when plastic is floating on the surface*

Turning the tide on plastic pollution through regional collaboration in Southeast Asia

Countries are using innovative methods to measure and monitor plastics leakage on land and into rivers and regional seas. Globally successful examples of market-based instruments and legislation are also being tried out. ASEAN members are looking for guidance and best practices to enable customization.

Heralded as a miracle material in the mid-20th Century, plastics now touch every aspect of daily life worldwide. But the explosion of plastic waste poses significant threats - and associated costs - for public health, livelihoods and the environment. Today, an estimated 11 million metric tons of plastic are entering the ocean each year. And without urgent action, this amount will triple over the next two decades.

Southeast Asia has emerged as a hot spot for plastic pollution, with its rapid urbanization, rising middle class and inadequate infrastructure for waste management. Plastic is estimated to account for 80% of all marine debris in the oceans. In six of the ten ASEAN member states alone, over 31 million tons of plastic waste was generated in a year. The sudden increase in single-use plastics and personal protective equipment during the COVID-19 crisis has put additional stress on countries working to tackle marine plastic debris.

The plastics economy is generally a cycle of take, make and waste. This means an estimated 95 percent of plastic packaging's value - US$ 80 billion to US$ 120 billion a year - is lost to the economy as items are thrown away. In Malaysia, the Philippines and Thailand, more than 75 percent of the material value of recyclable plastic is lost - the equivalent of US$ 6 billion a year - when single-use plastic is discarded rather than recovered and recycled, according to some studies by the World Bank Group (WBG).

Countries across Southeast Asia have been preparing action plans and circular economy road maps that prioritize plastics-related policies and investments in key sectors and locations. But with shared rivers and coastlines as well as regional markets for plastic products and plastic waste, countries cannot tackle this challenge alone. Solutions need to cross borders.

▲ *Plastic washed ashore litters Kuta Beach on the Bali Island (Indonesia)*

Recognizing the transboundary nature of marine plastics, ASEAN released the Bangkok Declaration on Combating Marine Plastics in 2019. Two years later, an ASEAN Regional Action Plan spelt out priority actions for member states. The Regional Action Plan will be implemented over the next five years, highlighting many opportunities for Member States to catalyze, collaborate and apply long-term solutions relating to plastics usage and plastic management. The Plan includes 14 Regional Actions across four pillars of Policy Support and Planning; Research, Innovation and Capacity Building; Public Awareness, Education and Outreach and Private Sector Engagement.

The Regional Action Plan was developed through extensive consultations with representatives from ASEAN, regional technical experts and the private sector. Support was also offered by the WBG, through PROBLUE, an umbrella multi donor trust fund housed at the WB, that supports the sustainable and integrated development of marine and coastal resources in healthy oceans. In August 2022, the WB approved a US$ 20 million grant to support these 14 actions, which include strengthening and harmonizing policies that govern the production and use of plastics across the region.

Countries are using innovative methods to measure and monitor plastics leakage on land and into rivers and regional seas - these range from drone monitoring in Cambodia to baseline assessments of the discharge of plastics in Indonesia.

Across the region, globally successful examples of market-based instruments and legislation are being piloted, such as plastic bag taxes, bans on certain plastic products and bottle deposit refund schemes. ASEAN member states are looking for guidance and best practices to enable customization. The private sector is increasingly helping to drive solutions.

Policies such as extended producer responsibility are being explored across Southeast Asia, to help ensure that companies that put plastic products on the market are required to pay for their collection, sorting and recycling after use. The relationship between plastics and society is evolving, with momentum focused on designing products to minimize waste, along with repurposing, reuse or recycling. This requires innovation throughout the plastic value chain, from new alternative materials (such as seaweed-based products) and sustainable packaging (such as coconut husk to replace Styrofoam) to innovative technologies (such as filters for washing machines or riverine plastic capture) and new types of financing (such as blue financing instruments).

Through a regional innovation platform that the WB project is supporting, ASEAN member states will be able to share and replicate plastic innovations, as well as connect to a variety of financing sources. From the private sector side, innovations often result from forward-looking policies. But initiatives to move towards plastic-smart designs are sometimes thwarted by a confusing array of regulations, standards, certifications and labelling that vary across countries.

For this reason, ASEAN member states are calling for support to regionally harmonize standards for recycled plastics, as well as technical requirements for plastic packaging and labelling. This should be accompanied by efforts to raise consumers' awareness, so that they make conscious and sustainable choices about what they buy. Because plastics are produced mainly from fossil fuels, the growing demand for them is also intensifying the climate crisis, both in their production and throughout the life cycle of plastic products.

If no action is taken, greenhouse gas emissions from the production, recycling and incineration of plastics could account for 19 percent of the total allowable emissions under the Paris Agreement, which seeks to limit warming by 2040 to 1.5 Celsius degrees. Reducing plastics thus has a critical climate co-benefit. Recent reports find that industry and governments have the solutions today that would reduce annual plastic leakage into the ocean by about 80 percent below projected levels by 2040. But to be able to do its part, Southeast Asia needs stronger regulatory frameworks, more innovative business models and a wider array of funding mechanisms.

Southeast Asia has seen its share of media reports, photographs and viral social media stories on "rivers of plastic," with sea turtles and other vulnerable marine life trapped in discarded fishnets. Although it has become a hot spot for mismanaged plastic waste, the region is resolving to turn the tide. With ASEAN's leadership, and with national and local initiatives across countries and communities, Southeast Asia is moving towards sustainability by transforming the ways that plastics are produced and used ■

HOÀNG ĐÀN

Trading garbage for money in Quảng Ninh

After 6 months in operation, the "Garbage ATM" program, named VRacBank, from Quảng Ninh Cement and Construction Company have gathered 20 tons of recylable trash and transferred out VNĐ 100 million (US$ 4,190) to people across the City. The first program of its kind, it was created on April 1st, 2022 and looks to retrieve sustainable resources for production, as well as play a big role in garbage disposal and environmental protection in Quảng Ninh's move to a green economy.

Every Wednesday and Friday mornings, workers of Quảng Ninh Cement and Construction Company, as well as residents of Phương Nam Ward, collect plastic, metal, paper, fabrics and other materials to exchange them for money.

Mrs. Vũ Thị Thuần is one of the most prolific contributors to this activity. She collects recyclable trash every day and delivers it to the Quảng Ninh Cement and Construction Company. She said: "Although the money's not much, if you collect a large amount of trash, it will help with daily expenses and most of all, protect the environment". According to Company workers, they always sort out their garbage at home and bring recyclables to the Factory.

Outside of the VRacBank program, the Quảng Ninh Cement and Construction Company and Phương Nam Ward collaborated to organize programs such as the "Reducing Plastic Waste Art Competition", which spread awareness for students on recycling and sorting out garbage. "The VRacBank scheme helped many workers and residents protect the environment. The Company has collaborated with local authorities to rally citizens in collecting recyclable garbage", said Deputy Chairwoman of Phương Nam Ward People's Committee Nguyễn Thị Dáng.

▲ *The VRacBank scheme helped many workers and residents protect he environment*

The idea for this project came when clinkers, a non-renewable material used to create cement, was running out and increasing in price. Quảng Ninh Cement and Construction Company researched and decided to use garbage as an alternative, therefore solving the material problem, reducing cost and reducing waste in households and factories.

According to Deputy Director of Company Vũ Trọng Hiệt, one kilogram of plastic waste when heated will generate 4,000 to 4,500 kcal. The garbage collecting Company will chop the plastic into small pieces and burn it into clinker. The waste burns in the oven at 1,400 degrees Celsius, so will not generate smog or toxic exhaust. The Company saved 10 - 15 percent of coal volume due to this new renewable material. In a year, the use of recyclable trash will generate a profit of VNĐ 13 billion (US$ 544,000), but the benefits to the environment and society are much greater.

Here's how the exchange of trash into money works; when garbage is brought to the Company to exchange, after measurements, collectors receive a ticket that has the amount of money and the number of bonus points accumulated. Collectors can choose to immediately receive money or save it in their accounts for later. People who can collect more than 100 kilograms of garbage will have special vehicles that come to their home to deliver the garbage to the Factory. When a collector's account reaches 300 bonus points, if he or she has not withdrawn their money yet, the Company will pay the interest of the remaining amount of money in the account, with a rate two times higher than the current savings interest rate of Vietnamese banks. There are currently 600 VRacBank accounts, with a total of 113,000 bonus points.

Mr. Vũ Trọng Hiệt said: "We are expanding the network of waste purchasing and sorting to all of Quảng Ninh. We are also organizing a competition to collect garbage across Uông Bí City on October 5th, with the winner earning VNĐ 10 million (US$ 418) ■

HƯƠNG ĐỖ

International partners commit to help Việt Nam realizing net zero emissions

▲ *A wind and solar energy project in Ninh Thuận Province*

International partners have committed to support Việt Nam in realising the goal of net zero emissions and energy transition as per the country's commitment at the 26th UN Climate Change Conference of the Parties (COP26), according to Vietnamese Minister of Natural Resources and Environment Trần Hồng Hà.

After the COP26 in 2021, in high-level meetings, the United Nations and development partners, during discussions with Vietnamese Ministries and sectors, expressed their willingness to support Việt Nam in achieving the goal of net zero emissions and energy transition, Minister Trần Hồng Hà noted. Partners including the United Nations, the European Commission and development partners including the United Kingdom, Denmark, Italy, Japan, China, South Korea, France, Germany, Australia, New Zealand, Finland, Netherlands, United States, the World Bank (WB) and the Asian Development Bank were ready to support Việt Nam in energy transition and renewable energy; building and perfecting institutions, policies, strategies and master plans; as well as developing the carbon market, he said.

The partners also pledged to help Việt Nam in inventorying and reducing greenhouse gas emissions; improving capacity and transferring technology; making financial support and helping reduce emissions and adapt to climate change, he said. Việt Nam was still facing difficulties in researching and deploying new technologies to ensure security and balance power sources, capture carbon and to produce renewable energy. Therefore, in order to achieve the goal of bringing net emissions to "zero" by 2050, Việt Nam urgently needed the support of the international community.

At the Conference, a representative of the European Union said that financial mechanisms and policies to mobilize capital would play a vital role in the development of future goals, especially technical and economic support. A representative of the WB in Việt Nam said this would be a journey with many difficulties, many new factors, many challenges and opportunities in the implementation of the goal of achieving net zero emissions and energy transition.

Mr. Trần Hồng Hà said after COP26, the Government and Prime Minister Phạm Minh Chính ordered relevant Ministries and sectors to deploy and update the Nationally Determined Contribution (NDC) in 2022; develop and publish a report on the potential of offshore wind and wave energy in Việt Nam›s seas; focus on building the National Strategy on Climate Change by 2050 and building the program on green energy transition ■

HƯƠNG TRẦN

Quảng Nam Province speeds up carbon credit export plan

The Province of Quảng Nam has been speeding up the process of building carbon credit exports as a key part of sustainable development and forest protection, setting its sights on being the first place in Việt Nam to export 1.2 million carbon credits per year from 2026.

Deputy Chairman of the Quảng Nam People's Committee Hồ Quang Bửu said it has been selecting consultancy agencies in setting up a future action plan on reducing greenhouse gas (GHG) emissions by increasing forest and conservation areas and creating a larger amount of carbon credits for export under the requirements of the global Reducing Emissions from Deforestation and Forest Degradation (REDD+) agreement.

The pilot plan of exporting 2.5 million carbon credits for an amount of VNĐ 110 billion (US$ 4.7 million) to VNĐ 130 billion (US$ 5.6 million) per year from 2021-25 has been agreed upon by the Government from 2021. "Quảng Nam will be the forerunner in Việt Nam implementing the plan of exporting carbon credits. It would help boost protection and development of forest while creating a budget for reinvesting for afforestation from carbon sale", Mr. Hồ Quang Bửu said.

"Local people will be involved in management, protection and growing forest in earning money from carbon exchange cost as carbon credits export values from two to 2.5 times as much as current payment for forest environment service from the State budget", he said. The first amount of 1.2 million carbon credits that had been reserved in 2018 - 2020 will be on sale at a price of US$ 5 per ton.

▲ *Local farmers grow ginseng in a forest in Nam Trà My, Quảng Nam Province*

An official from the National Forestry Administration of Việt Nam, Mr. Phan Văn Điển said Việt Nam has the potential in promoting carbon credits export, but it needs strict and transparency management policy in carbon emission control. "Legal regulations on carbon credits and detailed guidance for trading credits are not yet available. Việt Nam has yet built-up surveillance system on the GHG and emission control for every industry, business and factory that follow the international standard", he explained.

The preparation of policymaking and market of carbon credits export will be implemented in 2021 - 2025. The Deputy Chairman of Quảng Nam Province said it will replant more than 50,000 hectares to reduce 14 million tons of carbon emissions while supplying seven million cubic meters of timber in 2030. He said the carbon export plan would help increase forest coverage in the Province to 60 percent.

Mr. Hồ Quang Bửu said the Province will open tenders for carbon credits as soon as the policy and procedure on the pilot plan are completed. He said at least five investors have paid attention to carbon credits sales in the Province.

The Province's 19,000ha is a protected area for endangered Asian elephants, with funding from the United States Agency for International Development (USAID) Green Annamites Project. It also promoted the Sông Thanh Nature Reserve to a national park to conserve its rich biodiversity over 77,000 hectares, of which more than 58,000 are tropical, evergreen primary forests, while an area of 15,000 hectares of Ngọc Linh ginseng (Vietnamese ginseng) was planted in Nam Trà My District. The Province has preserved a UNESCO-recognized World Biosphere Reserve Chàm Islands (Hội An City) and the reserve of Sao la (Vũ Quang National Park, Hà Tĩnh Province), or Asian Bicorn (one of the world's rarest large mammals) in Tây Giang District (Quảng Nam Province). An area of 100 hectare-forest has been built as a safe habitat for a herd of grey-shanked douc langurs in Núi Thành District in 2019 - 2028 ■

PHƯƠNG TÂM

The truth about online shopping and its environmental impact

Global e-commerce has grown steadily over the past decade. The COVID-19 pandemic has pushed the sector, even more, triggering changes in consumer behavior and leading to staggering records in sales. Big companies such as Amazon, Alibaba and Walmart have monopolized online shopping and increased consumers' expectations. Digitalization and technological innovations have indeed allowed the industry to do what was believed to be impossible just a few decades ago. However, this revolution comes with high costs for our planet. We take a look at the growing trends in online shopping and its environmental impact.

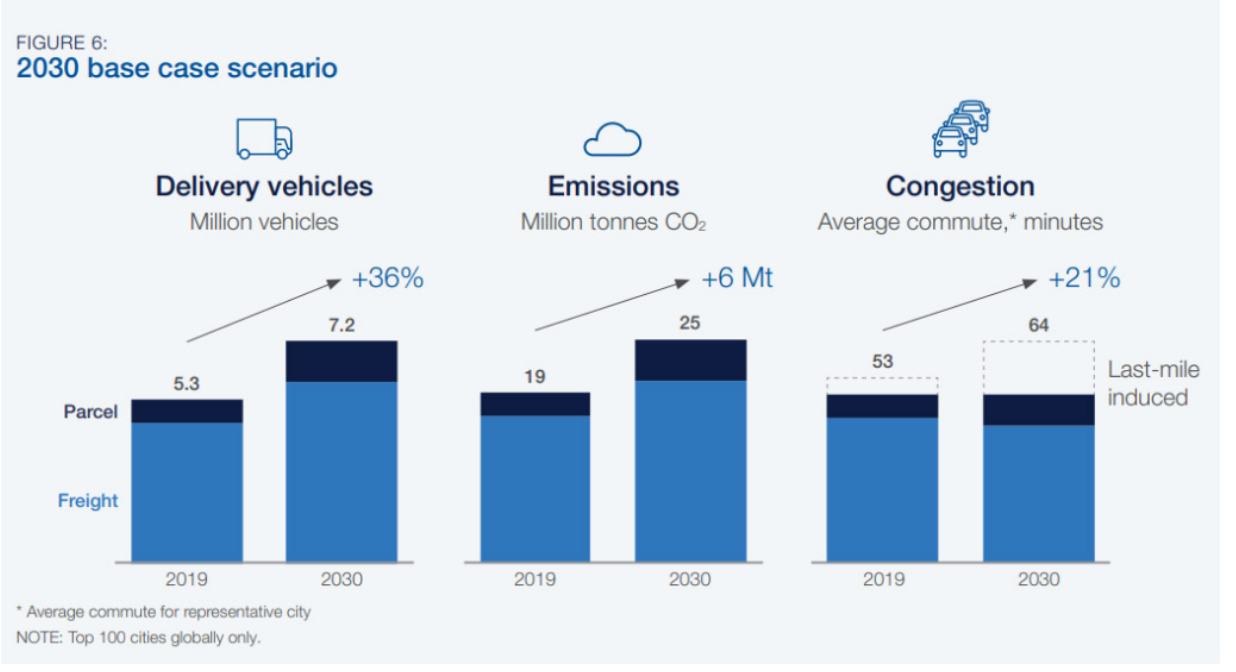
The growing trends in online dropping

We are living in times when consumerism is at its finest. The digitalization of modern life as well as new, innovative technologies have completely transformed the way in which people shop. In the past decade, the number of digital buyers has climbed at an unprecedented pace, turning e-commerce into a multibillion-dollar industry. Furthermore, since the outbreak of the COVID-19 pandemic, digital channels, which were already growing at a steady pace, have become by far the most popular shopping alternative for consumers around the world, sparking an extraordinary increase in online purchases. In June 2020, global retail e-commerce traffic reached a record 22 billion monthly visits and a staggering US$ 26.7 trillion in sales.

By the end of this year, Asia is set to account for 50% of the world's total online retail sales, most of which take place in China, currently the world's leading country by retail e-commerce sales. Indeed, over the past two years, major shipping companies have had a hard time keeping up with the demand and they have been struggling to deliver packages all over the world. The global supply chain is at a breaking point and unless consumers change their shopping attitude and their expectations when buying online, the crisis is likely to reach a point of no return. And as much as big corporations are easily blamed for this crisis, consumers are equally responsible.

There are three key differentiators that consumers seek when buying online: price, speed, and convenience. Amazon, the world's leading online marketplace in terms of traffic, has found the perfect formula to satisfy all three of them, by training its customers into believing that free and fast shipping is something they should have, thus forcing smaller retailers to adopt the same strategy in order to keep up with giant competitors. While buying online was initially a way to find the best deals, with innovation and technology, e-commerce has turned into a fast machine conceived to satisfy more and more consumers' demands and expectations. In September 2021, several industry groups representing over 65 million transport workers wrote an open letter to heads of state at the United Nations General Assembly, warning that, if this trend continues to grow at the same rate, global transport systems are going to collapse.

▲ *Products' packaging contributes in large part to CO_2 emissions from producing plastics*



▲ *The transport of goods across the world is responsible for a huge portion of CO_2 emissions generated by e-commerce*

The issue of over-packaging

The online shopping addiction of modern consumers is not only leading the global supply chain to a point of no return, but it is also having a huge environmental impact with huge catastrophic consequences on our planet. Indeed, with the boom in online shopping came, not surprisingly, huge environmental issues. The effects can be seen worldwide. However, there is one country where the industry's repercussions on the environment are particularly visible: China. The country's e-commerce success is unmatched worldwide, with experts predicting that 52,1% of the country's retail sales will come from online shopping in 2021. The success is mainly attributed to China's rapid evolution of the internet and the digitalization of payment systems. However, as the country's e-commerce is able to generate hundreds of billions of dollars in revenue from a single shopping day like Double 11, environmental groups warn consumers that this shopping extravaganza comes at a dramatic cost to the planet.

Products' packaging contributes in large part to CO_2 emissions from producing plastics, polluting ecosystems as well as adding enormous amounts of waste to our landfills. 3 billion trees are pulped yearly to produce 241 million tons of shipping cartons, the forest conservation group Canopy found. And of the 86 million tons of plastic packaging produced globally each year, not even 14% is recycled. As for China, statistics from the State Post Bureau showed that the country's courier handled 83 billion express parcels in 2020 alone, which accounted for 1.8 million tons of plastic waste and nearly 10 million tons of paper waste. In Hong Kong alone, 780 million pieces of packaging waste from online shopping was generated over the course of 2020, according to a recent study by the local group Green Sense. The study also showed that, on average, 2.18 pieces of packaging were used for each product in the same year, mostly consisting of mixed materials, which are hard to recycle. As space for landfills become scarcer, China is struggling to keep up with the growing e-commerce waste mountain. Companies such as Alibaba are thus developing more sustainable packaging, trying to reverse the trend while the Chinese Government is taking steps to regulate packaging standards.

The impact of shipping goods

Shipping emission is another online shopping environmental impact to consider. The transport of goods across the world is responsible for a huge portion of CO_2 emissions generated by e-commerce. In 2020, the shipping and return of products accounted for 37% of the total greenhose gas (GHG) emissions. It is estimated that by 2030, the number of delivery vehicles will increase by 36%, reaching approximately 7.2 million vehicles. This will not only result in an increase of about 6 million tons of CO_2 emissions, but it will also increase commutes by 21%, as vehicles will take longer to travel due to higher traffic congestion.

The real problem, however, lies in fast shipping. As new technologies improve the transport of goods and make it as fast as it

▲ *Online shopping and its environmental impact including carbon emissions*

had ever been before, more and more consumers request same-day and instant deliveries, two options that have been growing 36% and 17% annually, respectively. These two options, as the World Economic Forum reported, are particularly popular in China, making up more than 10% of the total amount of parcels being delivered each day, which are on average nearly 3 million. A study from Massachusetts Institute of Technoloy found that traditional shopping has two times the carbon footprint if compared to online shopping. This discourse, however, is valid only if one does not take the rushed online shopping into account. Indeed, when consumers opt for a fast delivery, the emissions far exceed those generated from in-person shopping. A major reason for this is that delivery companies cannot afford to wait for all products to arrive before shipping them out. When dealing with a one- or two-day shipping window, they are often forced to send out trucks that are filled at half their capacity, generating more traffic and thus emissions.

But shipping is not the only issue. As more and more online retailers, big and small, offer the option to send back goods easily and often for free, return rates, especially of fashion items, have skyrocketed, exceeding 30% of all purchased goods. A study on consumers' behavior showed that 79% of consumers want free return shipping and 92% of them are likely to buy again if the items they purchase are easy to return. It is statistics like these that incentivize companies to offer such options, as they will eventually be lucrative for them.

There is little doubt that the e-commerce revolution has brought enormous advantages. However, online shopping and its environment impact must not be ignored. Nowadays, most consumers choose convenience over principles. And, as much as companies trying to become more and more sustainable is a good step in the right direction, these changes alone will not entirely solve the problem. Consumers are the ones that have the last word and it is their behavior and their decisions that eventually determine the impact of this industry. Thus, the only way to reverse the dangerous trend that e-commerce has taken, there needs to be a mind shift from both the producer's as well as the consumer's side ■

HỒNG NHUNG

Air pollution is the world's leading environmental cause of illness and premature death. Fine air pollution particles or aerosols, also known as fine particulate matter or $PM_{2.5}$, are responsible for 6.4 million deaths every year, caused by diseases such as ischemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease, pneumonia, type 2 diabetes and neonatal disorders. About 95% of these deaths occur in developing countries, where billions of people are exposed to outdoor and indoor concentrations of $PM_{2.5}$ that are multiple times higher than guidelines established by the World Health Organization. A World Bank (WB) report estimated that the cost of the health damage caused by air pollution amounts to US$ 8.1 trillion a year, equivalent to 6.1% of global GDP.

Poor people, elderly people and young children who come from poor families are the most affected and the least likely to be able to cope with the health impacts that come with air pollution. Global health crises such as the COVID-19 pandemic weaken the resilience of societies. Compounding this, exposure to air pollution is linked to increased incidence of COVID-19-related hospital admissions and mortality. In addition to health, air pollution is also linked to biodiversity and ecosystem loss and has adverse impacts on human capital. Reducing air pollution, on the other hand, not only improves health but strengthens economies. A recent WB study found that a 20% decrease in $PM_{2.5}$ concentration is associated with a 16% increase in employment growth rate and a 33% increase in labor productivity growth rate.

What you need to know about climate change and air pollution

How is air pollution related to climate change?

Air pollution and climate change (CC) are two sides of the same coin, but they are typically addressed separately. They should be tackled jointly, with a focus on protecting peoples' health-particularly in low-and middle-income countries-to strengthen human capital and reduce poverty. Air pollutants and greenhouse gases often come from the same sources, such as coal-fired power plants and diesel-fueled vehicles. Some air pollutants do not last long in the environment, notably black carbon - a part of fine particulate matter ($PM_{2.5}$). Other short-lived climate pollutants (SLCPs) include methane, hydrofluorocarbons and ground-level or tropospheric ozone. SLCPs are far more potent climate warmers than carbon dioxide. Methane is a precursor of ground-level ozone, which according to the Climate and Clean air Coalition and Stockholm Environment Institute, kills about a million people each year and is 80 times more potent at warming the planet than carbon dioxide over a 20-year period. Their relatively short lifespans, coupled with their strong warming potential, means that interventions to reduce SLCP emissions can deliver climate benefits in a relatively short time. If we address short-lived climate pollutants, we gain dual benefits: better air quality and improved health where we live, and the global benefit of mitigating CC.

A WB's study found that $PM_{2.5}$ from the burning of fossil fuels such as coal combustion or diesel-fueled vehicle emissions is among the most toxic types of $PM_{2.5}$. Particles from these sources are more damaging to health than particles from most other air pollution sources. Addressing these sources of $PM_{2.5}$ - like coal combustion and traffic - would address the most toxic air pollution. Given that these sources are also key contributors to climate warming, tackling air pollution from these sources also mitigates CC.

What are some requirements for effectively addressing air pollution?

Measure it and monitor it. Many developing countries do not have even rudimentary infrastructure for measuring air pollution. A WB study found that there was only one $PM_{2.5}$ ground-level monitor per 65 million people in low-income countries and one per 28 million people in Sub-Saharan Africa; in contrast, there is one monitor per 370,000 people in high-income countries. This is a serious issue, because you cannot properly manage what you do not measure. If you don't know how bad your problem is, you won't know whether anything you do to fix it is effective. Countries need to establish ground-level mo manufacturing industries that are causing environmental degradation and subsequent impacts on human health in Sub-Saharan Africa and South Asia nitoring networks and operate and maintain them properly, so they yield reliable air quality data.

▲ *Manufacturing industries are causing environmental degradation and subsequent impacts on human health in Sub-Saharan Africa and South Asia*

Know the main sources of air pollution and their contributions to poor air quality. For example, in City A, transport may be the biggest contributor, but in City B, it could be something completely different, such as emissions from dirty cooking fuels seeping from homes into the outside environment. With this information

you can target interventions appropriately to abate air pollution. There are certainly intuitive, no-regret steps cities and countries can take to tackle air pollution, such as shifting to clean buses or renewable energy. But if you want to address air pollution comprehensively, you need to understand what your own sources are.

Disseminate air quality data to the public. People have a right to know the quality of the air they're breathing. Disseminating this information exerts pressure on those who can make the needed changes. Air quality data should be easily accessible in formats that are widely understood, so people can reduce their exposure to air pollution and protect vulnerable groups such as young children, the elderly and people with health conditions that can be exacerbated by poor air quality.

What are some interventions that countries can implement to reduce air pollution?

Reducing air pollution may require physical investments or it may require policy reforms or both. Not every intervention fits every context. Interventions whose benefits (notably improved health) outweigh the costs should be selected. Part of our work at the WB is to incorporate CC considerations into analysis so that the climate benefits of improving air quality can be taken into account in the decision-making process. A few examples of interventions to improve air quality in different sectors:

Energy: Change the energy mix to include cleaner, renewable energy sources and phase out subsidies that promote use of polluting fuels.

Industry: Use renewable fuels, adopt cleaner production measures and install scrubbers and electrostatic precipitators in industrial facilities to filter particulates from emissions before they are released into the air.

Transport: Change from diesel to electric vehicles, install catalytic converters in vehicles to reduce toxicity of emissions, establish vehicle inspection and maintenance programs.

Agriculture: Discourage use of nitrogen-based fertilizers; improve nitrogen-use efficiency of agricultural soils; and improve fertilizer and manure management. Nitrogen-based fertilizers release ammonia, a precursor of secondary $PM_{2.5}$ formation. Nitrogen-based fertilizers can also be oxidized and emitted to the air as nitrous oxide, a long-lived greenhouse gas.

Cooking and heating: Promote clean cooking and heating solutions including clean stoves and boilers.

What is the WB doing to help?

The WB has invested about US$ 52 billion in addressing pollution in the past two decades. However, we need to scale this up. Some successful projects that address air pollution include:

In China, WB supported a program in the Hebei region, the largest contributor to air pollution in the country. The overall result was a reduction in the concentration of $PM_{2.5}$ in the atmosphere by almost 40% between 2013 and the end of 2017. The program linked loan disbursements to tangible results. Hebei issued the most stringent industrial emission standards in the country, replaced diesel buses with electric buses, coal stoves with gas stoves and improved the efficiency of fertilizer use in agriculture. The program also supported effective use of a continuous emission monitoring system to track and enforce compliance by all major industrial enterprises in the province. The project delivered about 5 million tons of CO_2 equivalent emissions reductions per year through interventions such as the installation of new stoves in municipalities and addition of a new clean energy bus fleet. The emissions reductions generated from the installation of 1,221,500 new stoves alone were equivalent to take more than 860,000 passenger cars off the road each year.

In Peru, the WB is supporting a project to develop environmental information systems that includes expanding the country's air quality monitoring network to six new cities. The project is also developing new systems to disseminate information on environmental quality to the public.

In Egypt, WB assessed the health impacts from environmental pollution, including the effects of ambient air pollution in Greater Cairo. We found that 19,200 people died prematurely and over 3 billion days were lived with illness in Egypt in 2017 as a result of $PM_{2.5}$ air pollution in Greater Cairo and inadequate water, sanitation and hygiene in all of Egypt. This analytical work has led to a project to reduce vehicle emissions, improve the management of solid waste and strengthen the air and climate decision-making system in Greater Cairo.

In Việt Nam, WB are working with the rapidly growing city of Hà Nội City to simultaneously combat the issues of CC and air pollution. We are supporting the Ministry of Environment and Natural Resources to improve the Air Quality Monitoring Network and develop an understanding of emissions sources, as well as an Air Quality Management Plan for the City.

In Lao PDR, the WB program supported the Government in establishing stringent ambient air quality standards, including a standard for annual average concentrations of $PM_{2.5}$ in line with the World Health Organization's air quality guideline value at the time. The program also supported the adoption of regulated procedures for sampling and analyzing $PM_{2.5}$ and PM_{10} in air and other pollutants in water ■

CHÂU LONG

Six species saved by ecosystem restoration

All around the world, on land and in the oceans, crashing populations of plants, animals and insects have sparked fears that planet Earth is entering its sixth mass extinction, with catastrophic consequences for both people and nature.

Worldwide, wetlands are the most heavily degraded ecosystem type. Another 35 per cent of natural wetlands have been lost since 1970 and of the 18,000 inland wetland-dependent species assessed for the IUCN Red List, about a quarter are globally threatened. One million of the world's estimated 8 million species are threatened with extinction. Ecosystem services essential for human wellbeing, including the provision of food and freshwater and protection from disasters and disease, are eroding in many places.

But hope is not lost. Under the umbrella of the United Nations Decade on Ecosystem Restoration, efforts are underway to revive battered terrestrial and marine habitats, from mountains and mangroves to forests and farmlands. As well as supplying critical benefits for people, restored ecosystems are a refuge for many endangered species. Here are six threatened mammals, reptiles and birds stepping back from the brink of extinction with help from restoration.

SAIGA STEPPING UP

After a shocking mass die-off in 2015, Saigas have experienced a baby boom in recent years. A goat-sized antelope with a comically big nose, Saiga once roamed in the millions across grasslands from Europe to China. But overhunting, the loss of habitat and migration routes, and outbreaks of disease have cut them down to remnant populations in Kazakhstan, Russia and Mongolia. Restoration efforts, including the Altyn Dala Conservation Initiative in Kazakhstan, are protecting and revitalizing some 7.5 million ha of steppe, semi-desert and desert and are already seeing results. Despite the mass die-off of 200,000 Saigas in 2015, the Kazakh population has bounced back from fewer than 50,000 animals in 2006 to over 1.3 million today.

▲ *A Saiga antelope calf in Kazakhstan*

GORILLAS CLIMBING

Confined to two misty forests in central Africa, there are only about 1,000 mountain gorillas in the wild. Yet that figure represents a steady increase since the 1980s and a reward for consequent protection and restoration work that is resulting in tourism revenue for protected area authorities and communities. Half of the remaining gorillas inhabit the volcano-dotted Virunga Massif, whose tripartite protected area straddles the borders of Uganda, Rwanda and the Democratic Republic of the Congo. Threats, including insecurity as well as climate change and disease, mean the great apes remain endangered.

Restoration work in the region has included the rehabilitation of more than 1,000 hectares in Uganda's Mgahinga Gorilla National Park with the removal of exotic trees so that native forest species can return, and there are plans to restore much more in the region.

MORE SPOTTED JAGUAR

While the need to preserve the Amazon draws deserved attention, a focus for restoration falls on its less-well-known neighbor the Atlantic Forest. More than 80 percent of the vast forest that stretched along the Brazilian Coast and into Paraguay and Argentina has been lost to things like agriculture, logging and infrastructure.

Wide-ranging restoration efforts are underway to counter the severe fragmentation of this biodiversity hotspot. They include the regeneration of forest on abandoned land and the creation of wildlife corridors between protected areas, strategies that are helping preserve predators like near-threatened jaguars and margays.

The world's most Southerly population of jaguars roams the Upper Paraná region of the Atlantic Forest straddling the borders between Brazil, Argentina and Paraguay. Here, reduced deforestation and the restoration of thousands of hectares of former forest land have helped the jaguar population rise by an estimated 160 percent since 2005.

▲ *Thanks to increased conservation, restoration and animal health measures, gorilla numbers have doubled over the last 30 years*

KEEPING THE DUGONG GRAZING

Restoring ecosystems is just as important in the water as on the land. In the ocean, vital habitats that have suffered destruction and degradation include seagrass meadows, which are essential for marine species, including Dugong as well as the fish that support coastal communities around the globe.

Dolphin-like Dugongs, whose gentle expression and liking for shallow water may lie behind old tales of mermaids, have vanished from much of their once-vast range due to hunting, entanglement in fishing gear and the loss of the seagrass on which they feed.

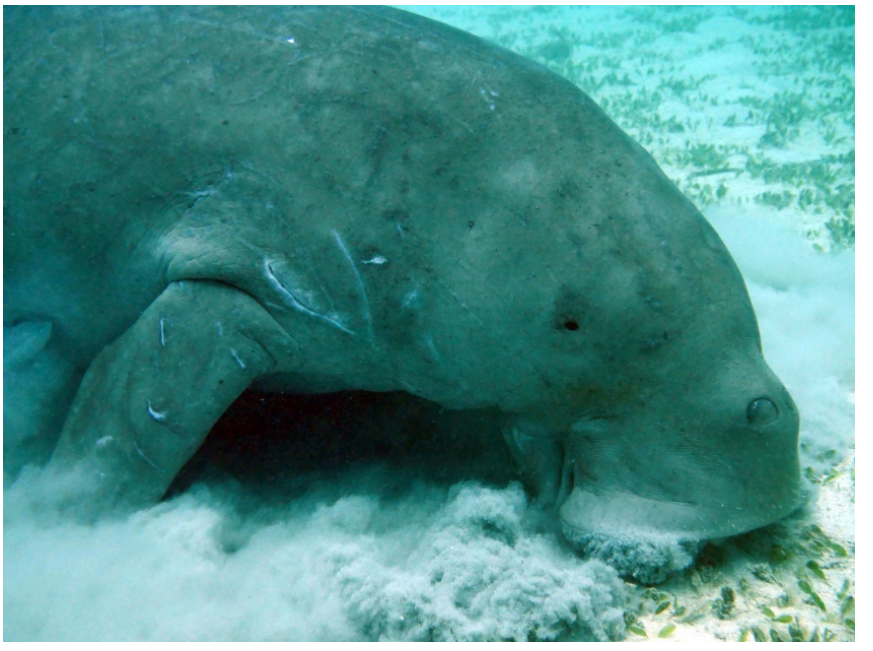
But restoration and protection in the last few strongholds - which include Australia, Mozambique and the Arabian Gulf - offer hope that the ocean's only herbivorous mammal can avoid extinction. In the United Arab Emirates, for instance, Abu Dhabi plans to restore another 12,000 hectares of mangroves, coral reefs and seagrass meadows on top of 7,500 hectares already revived.

▲ *Jaguars playing at a reintroduction center in Argentina*

ACCELERATING RACERS

Animals and plants unique to islands and archipelagos are especially vulnerable to extinction, like the giant wingless moas of New Zealand or the dark flying fox of Mauritius and Reunion. But islands are also fertile ground for the ecological restoration of endangered species. The Antiguan Racer is a harmless snake endemic to the twin-island nation of Antigua and Barbuda. Non-native Mongooses introduced in the 1890s to control rats feasted on the snakes and their lizard prey with the result that, by 1995, only about 50 Racers survived on a single offshore islet.

Restoration efforts have since cleared several islands of invasive predators, moving their ecosystems back toward a natural state and the Racers now number more than 1,100 individuals spread across four sites. Bird colonies on the islands have also made spectacular recoveries thanks to the removal of predators.



▲ *Dugong feeds on a seagrass bed, the animal's main source of nutrition*

▲ *The Antiguan Racer once the world's rarest snake, has made an incredible comeback*

BITTERNS BOOMING

In the United Kingdom, restoring natural processes in degraded wetlands and at former industrial landscapes has revived an iconic waterbird as well as providing opportunities for rest and recreation to people in nearby urban centers.

▲ *The iconic Bittern, camouflaged in its wetland habitat*

The Bittern's booming call again sounds across the lakes and reedbeds of many wetlands in England, including at former coal mines and gravel pits converted to nature reserves. It's quite a turnaround for a bird that 20 years ago was on the brink of extinction in the United Kingdom ▪

NAM VIỆT

Attraction of Hòn Nội Nest

Hòn Nội Nest is located in Nha Trang Bay, about 20km North of Cầu Đá Port. It is an island given the natural landscape and quite special geological features, the East of the Island is surrounded by the cliffs, standing up as the wall, in the middle of the sea over the sandy white natural sand, stretching to form a beautiful and unique beach.

When you come to visit, tourists can climb to the top of Du Hạ Mountain at 90m altitude to view the beautiful Hòn Nội Island and panoramic view of the immense blue sea sky, experience many discoveries. You will find interesting experiences about the life of birds' Nests. In addition, visitors can visit the temple nest to learn about the history of the oat mining industry... When visiting the Cave Nest and learn the life of birds you will encounter many watchmen of the local people. On the Island, there are bridges made of bamboo, wooden zigzag to go from one cliff to the other, very beautiful and safe to take photos.

▲ *Panoramic view of Hòn Nội Island, Nha Trang City, Khánh Hòa Province*

From Cầu Đá Port, visitors will take about 1 hour by boat to Hòn Nội. You can only come here from March to September because the rest of the month is the rainy season, so the train is not running. You are required to book a tour of the day, do not stay overnight for 350,000 VND/person. The tour includes breakfast with cakes and mineral water on the boat, lunch at the Island restaurant, afternoon snack, shuttle bus, boat to the Island, boat to view the coral, go sightseeing Cave. Coming here, you can also visit Hòn Ngoại Island and Hòn Sam Island is just a few minutes away by train.

▲ *The poetic natural space of Yến Island - Hòn Nội*

Hòn Nội Island also has Double Beach. This is a unique beach as its name. From the top of Du Hạ Mountain, you can see the beach is made from curved sand curved on two sides as the two C backed together. The sea is calm, the water is in jade. Visitor can enjoy swimming and watching live corals and colorful fishes ▪

HIỀN NHÂM

Hòn Mun Marine Reserve

Hòn Mun (Mun Island) Marine Reserve located in Nha Trang Bay, it consists of islands such as Hòn Tre, Hòn Miếu, Hòn Tằm, Hòn Một, Hòn Mun, Hòn Cau, Hon Vung, Hòn Rơm, Hòn Ngọc and surrounding by waters. The area of about 160km² covers about 38km² of land and 122km² of water around the Islands.

▲ *Hòn Mun Marine Reserve viewed from above*

Nha Trang Bay is one of the most important areas for marine tourism in Việt Nam. Coral reefs are of international importance and biodiversity is the highest in Việt Nam with over 350 species of hard coral creating reefs, of which 40 are newly recorded for Việt Nam, over 230 species of reef fish, 112 mollusks, 112 crustaceans, 27 echinoderms, 69 seaweed species and 7 seagrass species...

Survey results of biodiversity and habitat Marine Reserve protected areas indicate that Mun Island is home to the richest and most diverse coral reefs in Việt Nam. It is of international stature because it has a number of similar species in the world center for coral diversity in the Indian-Pacific region. In the black stone caves of

▲ *Arrive in Hòn Mun, visitors can scuba dive to see colorful coral reefs with many different marine species*

▲ *Mun Island is home to the richest and most diverse coral reefs in Việt Nam*

Hòn Mun every year there are birds nesting to nest. Because the terrain of the Island is very close to the hot currents from the equator, it is suitable for the development of corals and many kinds of tropical sea creatures. The sea bottom of Hòn Mun area is a collection of rich and diverse marine organisms, a very interesting and interesting observation and research place for marine, oceanographic and visitors to find understand the sea. Arrive in Hòn Mun, visitors can scuba dive or go to the glass bottom boat to see colorful coral reefs with many different marine species.

At Hòn Mun, in a depth of about 10m, you can admire the great view of the aquarium. You can delight in playing with all kinds of fish of all colors and colors. At present, Hòn Mun also has services on the bottom of the sea, couples who come here often to organize a wedding for themselves are unique and new. Blending with nature, they organized the most important day of their life with romantic, sparkling and fanciful scenery on the ocean floor. This is also a service that is attracting more and more young couples interested and learn. Although diving service has been developed and expanded in many sea resorts, Hòn Mun is still the most beautiful diving destination in the country. Hòn Mun has been leaving a good impression on visitors in and outside the country ▪

ANH THƯ

Lảo Thẩn is considered "the roof of Y Tý", in Phìn Hồ Village (Y Tý Commune, Bát Xát District, Lào Cai Province). Lảo Thẩn's Peak is 2,862m above sea level, which makes it an ideal destination for mountaineering enthusiasts next to the Fansipan of Sa Pa.

EXCEEDING YOURSELF

If you have conquered "the roof of Indochina" - Fansipan (Sa Pa, Lào Cai), then conquering the Lảo Thẩn in Bát Xát District, you will not be too difficult. However, for many travelers, whose lifestyle is mostly sitting in front of a computer and then it would be quite a challenge. A long with many others participating in examining the walking route to conquer Lảo Thẩn that day, I have to say that we were very proud of ourselves.

The weather in Lào Cai in general is suitable for climbing all year round. Except for rainy days, every season brings different and interesting experiences for visitors. In the spring, there are white clouds. In contrast, the summer sky is very clear. Autumn's weather is beautiful with light sunshine. Last but not least, in wintertime, days are foggy with tree branches, flowers... scattered everywhere, more than enough to arouse the enthusiasm of Lảo Thẩn's conqueror.

Going up from the sky gate, there is a tent area which can hold hundreds of people, with kitchens and toilets. This is an ideal checkpoint for those who choose to go overnight to conquer the Lảo Thẩn Peak. Visitors can camp overnight, watch the stars shine and listen to the song of the wind. From here, visitors can quickly travel to the top to watch the sunrise. The top of the mountain will be covered clouds. The winds will rush clouds from the valley to the ridge. Anywhere tourists stand will become their own personal observatory.

Conquering Lảo Thẩn Mountain

▲ *Lảo Thẩn natural scenery*

We went there in a group of nearly 30 people that day, including representatives from different businesses such as travel agencies, accommodation, restaurants, transportation, teachers and reporters. We started our journey from Y Tý Commune at 8:30 am with the guidance of a member of the local poster group, Sùng A Hồ. We plan to conquer the summit at about 13:00 that day and descend in the afternoon. The first section of the route slightly slopes for about 1km. The road was steep and high, which was quite challenging. Due to the steep path, some of us had to go back down before ever reaching the top. Although it could be easy for professional athletes or regular mountain climbers, it was definitely not easy for our crew. At some point, we had to stop and take a breath every 10m, but we kept moving forward. Just like that, we motivated each other and kept the morale high.

Unlike other typical tourist groups, we all brought our own cameras, lunch, fruit, and water to use for the journey. The poster group is just in charge of guiding and storing water just in case anyone goes missing. The native poster guy was walking and talking to distract us from feeling tired. When we faced steep sections of the route, he quickly collected dry branches along the road to make walking sticks that have helped us a lot on our way to conquering the top of the mountain. When walking past beautiful sights, our friend turned into a professional cameraman who helped us take memorable pictures, which we will keep for life.

A WELL-DESERVED REWARD

From talking with Mr. Sùng A Hồ, we found out that the length of the journey is 7km, which would be a total of 14km for the whole trip. The first section is a bit steep, where you can still see the locals' houses. Continuing on the path, we find ourselves at "the Heaven's Gate" as the path is not covered by trees anymore, and we can see very far, which makes it the most beautiful part of the journey. From here, we'll climb the last few steep slopes to the Lảo Thẩn summit.

On the top of Lảo Thẩn, we can freely enjoy the whole landscape and take pictures. Fresh green hills full of tree sprouts in the background are such a rare sight for us to see. Our friend explained that because of the previous cold weather, the whole area was covered with ice.

▲ *Conquering Lảo Thẩn Mountain*

▲ *Y Tý clouds*

Most of the bushes and small trees could not survive. That is why we were able to find so many green sprouts, which is a rare and beautiful sight. Lảo Thẩn is so special because every time we conquer the mountain, there is a change of scenery. New emotions will come to us every time we step foot here. For the first time in our lives, our crew enjoyed lunch on top of a mountain in such an open space with no trees around us.

Experiencing these strange emotions would not have been possible without conquering the mountain for ourselves. The Lảo Thẩn Peak brought all of us ultimate happiness that day. After such a challenging journey, we were overwhelmed with emotions on "the roof of Y Tý". We posed in every pose that we could think of for countless pictures and put on our faces the smile of a winner. It was beyond all our expectations, and we decided that the challenge and the journey were surely worth ▪

PHƯỚC HÀ

Việt Nam views green tourism as sustainable development direction

Defined to become a key economic sector, Việt Nam's tourism industry depends much on the natural environment. Therefore, for sustainable development of tourism, it is inevitably to follow the direction of green tourism.

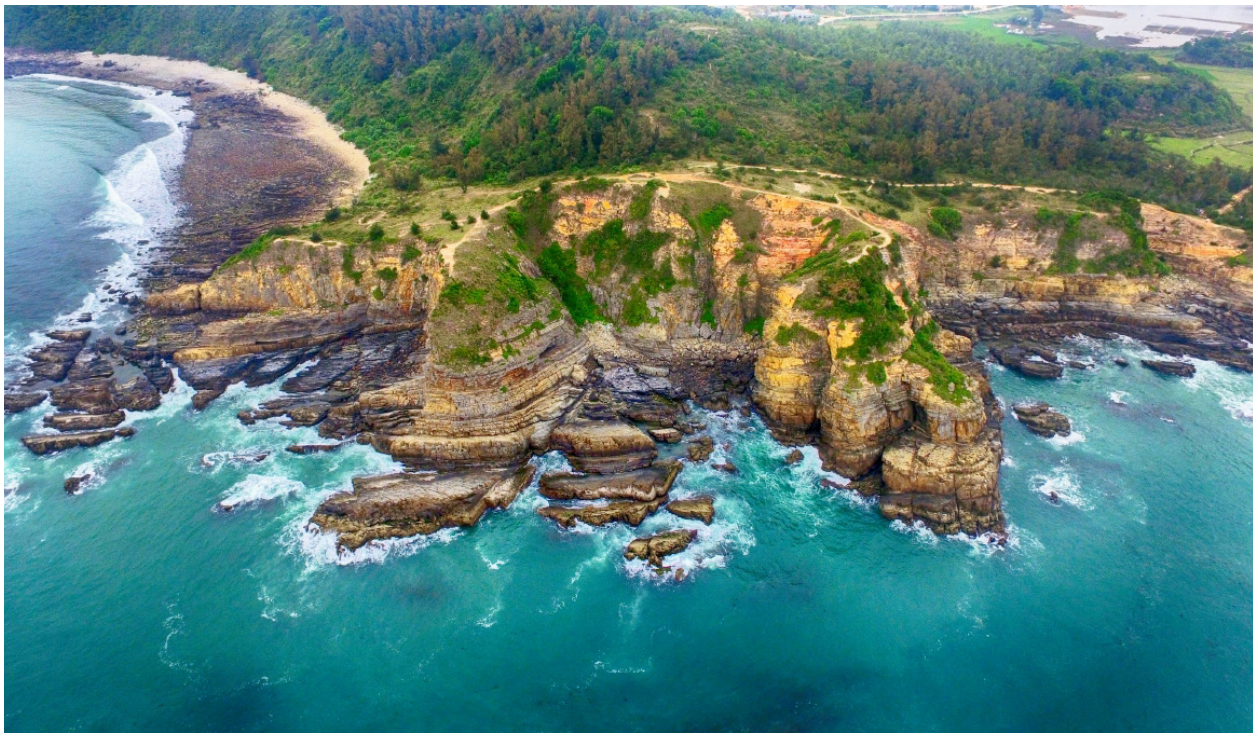
The World Tourism Organization considers Southeast Asia the 4th largest international tourist attraction in the world and Việt Nam is one of the 10 countries with the fastest tourism growth. Việt Nam is a country with great potential in developing green tourism with rich and diverse resources, many beautiful landscapes and historical sites.

In line with the global trend, Việt Nam's tourism industry has identified green tourism and sustainable tourism on the basis of green tourism as a development path in the next ten years.

Sustainable, not temporary growth

Defined to become a key economic sector, Việt Nam's tourism industry depends heavily on the natural environment. Therefore, for the sustainable development of tourism, it is inevitable to follow the direction of green tourism. Việt Nam is one of the 10 countries with the longest coast compared to the total country's territory at 3,260km and also a country with 2,360 large and small rivers. A bottle of water thrown into a river in remote mountainous provinces like Điện Biên, Lai Châu, Hà Giang on the Northern border, or Đắk Lắk, Kon Tum in the Central Highlands, might eventually drift out into the sea. All plastic waste in one way or another "finds its

▲ *Topas Ecolodge Resort (near the Northern Town of Sa Pa, Lào Cai Province) as one of the world's 10 greenest resorts*



▲ *Cô Tô Island, Quảng Ninh Province seen from above*

way" into the river and then floats out into the ocean. Therefore, each of citizen is not innocent in this story. To have a green and safe travel environment, practical action must be taken now.

Over the past few years, Việt Nam's tourism sector has made breakthrough developments which, according to experts in the Việt Nam Annual Tourism Report 2018, increased the number of international visitors by 22.9 percent (while the world average is 5 - 6 percent). This is a very high growth rate, making Việt Nam a "hot spot" for global tourism. When becoming an attractive destination, the tourism industry immediately faces the fast development of the system of hotels, restaurants, and entertainment sites.

Time to treat the environment well

Green tourism is a type of tourism that operates in a way that minimizes the impact on the environment, making a positive contribution to biodiversity protection, using renewable energy and promoting natural and cultural heritage and developing environmentally friendly products.

Since 2017, there have been kayaking tours combined with waste collection on the Hoài River introduced by Hội An Kayak Tourism Company in Hội An Town (Quảng Nam Province). The tour costs around US$ 10 for a person, with four hours of sightseeing and waste collection. Many domestic and international tourists initially joined in curiosity and were really excited. This meaningful activity also gradually attracts a large number of locals to take out the trash with tourists.

Hội An is also one of the pioneering localities in reducing plastic waste and building a friendly tourism environment. Sapo Hội An Restaurant in the past five years has converted about 300 liters of used cooking oil to turn into kitchen soap, instead of discharging it directly into the environment.

Tourists are being asked not to bring plastic bottles, bags and other single-use plastic items when visiting Cô Tô Island District in the Northern Province of Quảng Ninh. The move will be piloted for three to six months before local authorities consider the official imposition of a ban on plastic use in efforts to boost sustainable tourism development.

Indigenous culture - Future of green tourism

Today, travelers tend to be more concerned about the quality of the destination. Tourist will stay longer if the destination has many interesting experiencing activities. The trend of cruises has changed in recent years to resorts in the mountains, to experience local culture.

New-generation tourists are environment-loving, respectful and environmentally responsible people, so the trend of finding unique cultural and ecological values is also becoming prevalent. With eco-friendly and close-to-nature destinations, people find their way back to their roots and culture.

The trips of these people have created a new trend for green and environmentally friendly tourism. This requires local Governments and businesses to keep up with that direction in developing green tourism ▪

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