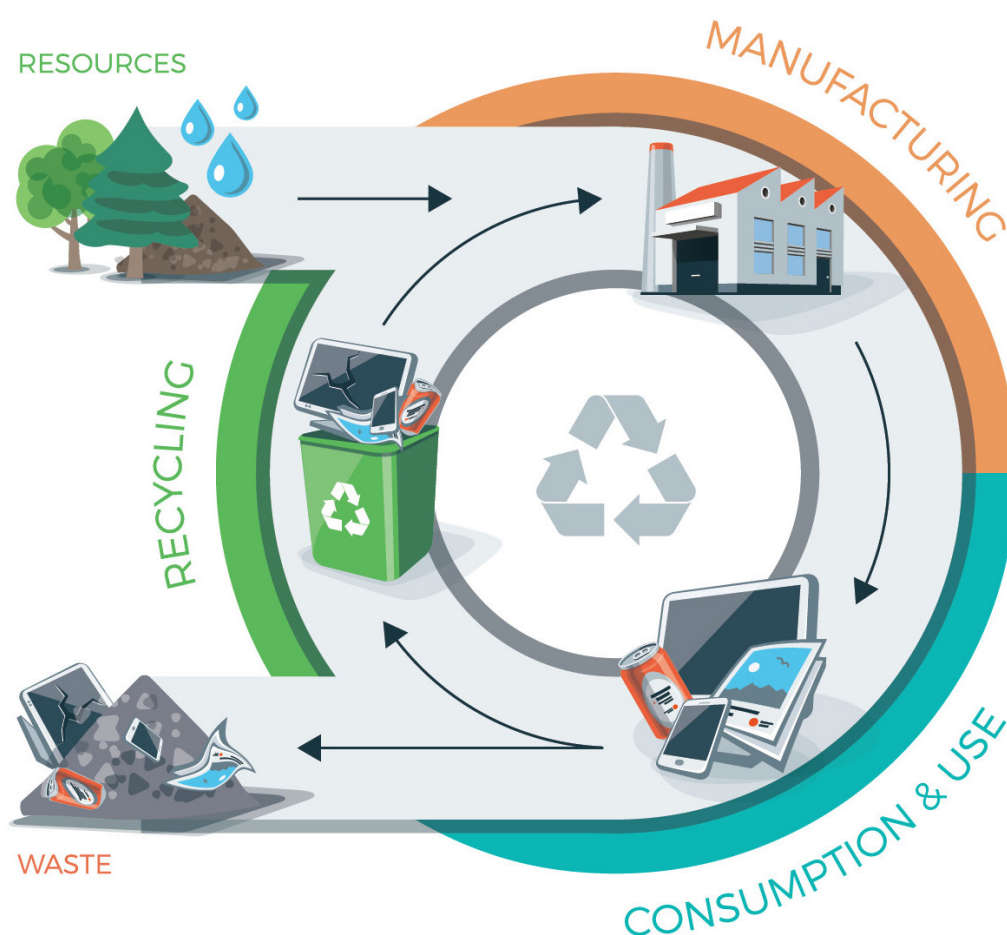




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LINEAR ECONOMY



**Implementation of the Action Plan on Circular Economy
in Vietnam: From theoretical basis to policy establishment**



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CONTENTS



RESEARCH

- [03] TRẦN TÂN VĂN, ĐỖ THỊ YẾN NGỌC, CAO THỊ HƯƠNG, HOÀNG XUÂN ĐỨC, ĐOÀN THẾ ANH, ĐOÀN THỊ NGỌC HUYỀN, NGUYỄN ĐÌNH TUẤN: The formation, development, and decline of the Van Don Ancient Trading Port system - From the perspective of natural characteristics and conditions
- [13] NGUYỄN HOÀNG NAM: Experience of international car manufacturers in accessing sustainable products for circular economy development
- [19] TRẦN NGỌC SƠN, HOÀNG VĂN CHUÔNG, NGUYỄN TƯỜNG VY, NGUYỄN VĂN LINH, HÀ MINH HIẾU, ĐOÀN CHÍ CƯỜNG: Assessment of ecosystem services based on i-Tree Eco model in the 29/3 Park, Danang City



FORUM - POLICY

- [23] HOÀNG VĂN THỨC: Strengthening inspection, investigation and supervision of hotspots to control environmental pollution in the Southern provinces
- [27] NGUYỄN THẾ CHINH: Implementation of the National Action Plan on Circular Economy in Vietnam: From theoretical basis to policy establishment
- [30] HOÀNG NHẤT THỐNG: Implementing the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment to 2030, with a vision to 2050
- [34] TẠ THỊ KIỀU ANH: Promoting the role of enterprises in implementing the Kunming - Montreal Global Biodiversity Framework and the Vietnam National Biodiversity Strategy
- [37] PHẠM ĐÌNH: Experience in implementing extended producer responsibility (EPR) to promote circular economy development in Korea



AROUND THE WORLD

- [39] AN VI: Circular economy businesses are extremely attractive to investors
- [41] HỒNG NHUNG: Redesign the business models to end plastic pollution
- [43] PHƯƠNG TÂM: The Treaty for the conservation and sustainable use of marine biological diversity
- [45] NAM HÙNG: As water-related disasters mount, experts push for early warning systems
- [46] HƯƠNG ĐỖ: 12 steps for governments to build climate and economic resilience
- [48] VŨ HỒNG: Exploring the ecosystem services and potential futures of coral reefs
- [50] BÙI HẰNG: Scaling up green chemistry globally for a sustainable future



POLICY - PRACTICE

- [52] ĐÀM THỊ MAI OANH: Rights to access information in the establishment and implementation of land use planning and plans in Viet Nam
- [57] CHÂU LONG: A systems approach for transitioning Southeast Asia to a circular economy
- [60] NAM VIỆT: Integrating a market-based approach to biodiversity conservation
- [63] HOÀNG ĐÀN: EcoBrick - A circular economy solution to transform plastic waste into sustainable concrete
- [65] NGUYỆT MINH: Expanding payment mechanisms for ecosystem services to bolster conservation efforts



The formation, development, and decline of the Van Don Ancient Trading Port system - From the perspective of natural characteristics and conditions

TRẦN TÂN VĂN, ĐỖ THỊ YẾN NGỌC, CAO THỊ HƯƠNG
HOÀNG XUÂN ĐỨC, ĐOÀN THẾ ANH
ĐOÀN THỊ NGỌC HUYỀN, NGUYỄN ĐÌNH TUẤN

Center on Karst and Geoheritage
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Abstract: There are many documents related to Van Don Ancient Trading Port (ATP) system, most of which have been published by historians and archaeologists based on historical literature or excavation results, and in general a consensus has been reached. Based on reference, aggregation of existing documents, and additional investigations and surveys, following the article will analyze the perspective of natural characteristics and conditions and signs of the premise of Van Don trading port through the periods to clarify the formation, development, and decline of the Van Don ATP system. This is also the clearest evidence of the Vietnamese tradition of exploiting and using sea and islands.

Keywords: Van Don Ancient Trading Port system; natural; geological; morphological.

JEL classification: N55, Q56, R11.

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1. INTRODUCTION

During the study on the Van Don ATP system, a question that naturally arises was whether this trading port only started operating after King Ly Anh Tong established Van Don site in 1149? Is it possible that the Van Don ATP system, or a certain part of it - its “precursor” - had previously operated? Some historical and archaeological documents seem to have confirmed this, although relatively scattered. In addition, with the comment that the Van Don ATP basically consisted of ports and wharfs on the sea, another question also automatically arises: since when has the sea existed on the North-eastern edge of Vietnam? Is it “as old as the Earth” and has it not changed since then? On the basis of existing documents and additional investigation and survey, this article attempts to give a different perspective over a longer period in association with the natural - geographical, geological - geomorphological context and characteristics, especially their fluctuations, to demonstrate the tradition of exploiting and using the sea as well as adapting to changes in the continental - oceanic interaction of the Vietnamese people, contributing to a better understanding about the values of the Van Don ATP.

2. RESEARCH METHODS AND TECHNIQUES USED

- Traditional methods and techniques of the natural and social sciences have been applied such as collecting, synthesizing, analyzing, processing existing documents, sociological investigation, surveying, mapping, analyzing and processing data, and additional sample analysis...

- Specialized research methods on tectonics - geomorphology and modern research methods such as analyzing remote sensing images, building databases... have been used.

3. RESEARCH RESULTS

3.1. Geological features and context

3.1.1. Rock outcrops in the Northeast coastal region

Rocks in the Northeast coastal region, according to the results of geological investigation and research [2, 6, 7, 8, 9], are divided into several formations/series categorized into the following groups:

Group of terrigenous, metamorphic sedimentary rocks rich in aluminosilicates (sandstone, siltstone, claystone) of the formations/series Co To (S_{1-2}^{ct}), Tân Mai (S_{1-2}^{tm}), Song Cau (D_{1sc}) (or Do Son (D_{1ds}), Duong Dong (D_{1-2}^{dd}), Bai Chay (P_{3bc}), Hon Gai (T_{3n-rhg}), and Ha Coi (J_{1-2}^{hc}). They formed “soil” islands (in whole or in part) such as Tran, Co To - Thanh Lan archipelago, Vinh Thuc, Cai Chien, Van Canh, Ngoc Vung, Cong Dong, Cong Tay, Chau Diep, Tra Ban, and Quan Lan...



Group of limestone and siliceous limestone of the Trang Kenh (D_2-3tk), Con Voi (C_1t-vcv), Pho Han (C_1t-vph) and Bac Son formations ($C-Pbs$). They formed “rocky” islands mainly found in Ha Long Bay and partly in the center of Bai Tu Long Bay such as Cho Island, Thien Nga Isle, Goi Isle, Tra Gioi Isle, Xep Isle, Cong Do Island, and Coc Tren Isle... (Trang Kenh formation), Cai Bau Island and many isles such as Cot, Su Tu Cai... (Con Voi formation), and islands in Ha Long Bay (Bac Son formation).

Group of Quaternary friable sediments mainly of marine origin, formed in the Holocene (11.7 Ka), including the Hai Hung formation ($Q_2^{1-2}hh$), the Thai Binh formation (Q_2^{3tb}) and the Upper Holocene sediments (Q_2^3). They distributed in small and narrow outcrops along the sea and islands, sometimes gradually connecting clusters of islets together to form a large island as in the case of Quan Lan - Minh Chau and Ngoc Vung islands... They have created a number of depositional topographies such as coral shelves (about 1m above sea level, including exposed boulders, pebbles, gravel, coral sand, and sea shells, which are the main components of ancient beach deposit containing Cai Beo cultural monuments dating back to about 9 - 7 Ka.), marine depository shelves (about 2m high, formed about 2.5 Ka.), low-tidal flats, high-tide flats (1 - 1.5m), modern beaches, and erosion terrain such as an abrasive shelf on bed-rock (such as the one found at the edge of Cong Tay Island at an altitude of about 4 - 6m, formed about 8.2 - 4.2 Ka.).

The islands in Ha Long Bay - Bai Tu Long Bay are mainly composed of limestone, terrigenous sediments, and siliceous rocks. Limestone was mostly dissolved after being weathered, leaving only some clay impurities. In continental conditions, it can form the so-called “terra rosa” (red soil), but in the marine environment it will probably be washed or eroded away. Weathered crust and soil cover therefore rarely form in the karst islands, which makes it difficult to form thick vegetation to store both surface water and groundwater and are therefore rarely inhabited. Siliceous rocks are quite resistant to chemical weathering and are usually crushed and abraded to form sand and grit. Only the silty sand, claystone, and terrigenous rocks which are rich in both clay and sand are capable of being weathered, washed away, eroded, and accumulated... to create a substantially weathered crust, thereby resulting in a thick soil cover and thick vegetation with good capacity of retaining surface water. Therefore, there are only a few “soil” islands where humans can live.

3.1.2. Location, context and structural-tectonic features

Ha Long Bay - Bai Tu Long Bay is on the Northwest edge of the Gulf of Tonkin in the Duyen Hai zone, the Eastern Vietnam fold system [2], or a part of the “Quang Ninh anticline” [9,10], occupying most of Quang Ninh Province and the Southern edge of Hai Phong City. This structure is adjacent to the “An Chau Inland rift superimposed depression” in the North and the Red River - Gulf of Tonkin young subsidence area in the South.

The geological formations that make up the islands in Ha Long Bay - Bai Tu Long Bay have formed an “asymmetrical anticlinorium” with the oldest rocks (Co To formation, $S_{1-2}ct$) distributed on the outermost islands (Tran Island, Co To - Thanh Lan Archipelago) and (Tan Mai formation, $S_{1-2}tm$) exposed in a narrow area on Vinh Thuc and Cai Chien islands at the Northeastern edge close to the mainland. They are interwoven with younger rocks of Late Paleozoic - Mesozoic age. The anticlines of the structure are mainly made up of rocks of the Tan Mai and Co To formations. The synclines are mainly formed from rocks of the Bac Son formation.

The whole structure has a slightly arc shape, gradually changing from the Southwest (SW) - Northeast (NE) in the SW to the South Southwest (SSE) - North Northeast (NNE) at the end of the NNE, embracing the NE coast, determining the shape of the shore, the distribution direction, and the topography of the islands in this region. The gradual change of direction of the above-mentioned arc shape is probably a result of the operation of two fault systems in the NE - SW and NNE - SSW directions that have cut and shaped the islands and island clusters in this region. On that common background, some islands and island series are still dominated by basically only one fault system, either NE - SW (such as Van Vuoc - Cai Chien Island series) or NNE - SSW (such as Sau Dong - Sau Nam - Cao Lo - Minh Chau - Quan Lan Island series).

“Quang Ninh anticlinorium” is also divided into “Van Don monocline uplift”, “Ha Long syncline downthrow block”, and “Cat Ba anticline uplift” [10]. The boundaries between these blocks are the faults in the Northwest (NW) - SE, NE - SW, and sub-latitudinal directions. “Van Don monocline uplift” has a quadrilateral shape; the NE side at the NNE extreme end in Quang Ninh Province extends to Tran Island, Co To - Thanh Lan Archipelago; the SW bottom edge is a NW - SE fault zone running through the area of Cong Dong - Cong Tay, Ngoc Vung, and Phuong Hoang islands. From there back to the SW is “Ha Long syncline downthrow block” with mainly karst islands ($C-Pbs$) all the way to “Cat Ba anticline uplift”, including the Cat Ba islands and Do Son coastal strip, mainly composed of rocks of the Do Son formation (D_1ds) and the Cat Ba formation (C_1cb).



It is called “Van Don monocline uplift” because the geological units exposed here are basically increasingly younger from the outermost edge in the Southeast (Tran Island, Co To - Thanh Lan Archipelago) towards the NW, from the Co To, Do Son, Cat Ba, Bac Son, Bai Chay, Hon Gai, and Ha Coi formations until meeting the Tan Mai formation (S_{1-2}) on a narrow outcrop on Vinh Thuc and Cai Chien islands.

A direct consequence of this structural feature, in addition to the extension of islands and island clusters and related to the formation of Van Don ATP system, is that the whole Bai Tu Long Bay is basically situated in the “Van Don monocline uplift” and is relatively shallow. Most of the seabed in the areas between the islands is only a few meters to less than 10 meters deep. Only off the coast of Quan Lan - Minh Chau Island series does the seabed's depth gradually increase and start to exceed 30m at tens of kilometers to the East - Southeast of this island series. On that shallow seabed developed some deeper sea creeks, but most of them are just under 20m deep, rarely up to 30m deep, and basically coincide with the direction of the islands and island series, i.e., NE - SW and gradually changing to NNE - SSW

This general structure is divided and complicated by other fault systems of NW - SE, sub-longitude, or sub-latitude direction, for example, the NW - SE fault running through Cong Dong - Cong Tay area, Ngoc Vung and Phuong Hoang islands, forming Cong Dong River and Cong Yen, Cong Hep on Ngoc Vung Island. The NW - SE faults have also created a number of NW - SE creeks separating the outer barrier islands, reaching a depth of 32m between Sau Dong Isle and Sau Nam Island, 20m between Sau Nam Island and Vanh Isle (Cua Sau), 22m between Vanh Isle and Ba Mun Island (Cua Noi), 20m between Ba Mun Island and Quan Lan Island (Cua Doi)... Additionally, some deep creek sections of sub-longitude and sub-latitude direction can be found in the vicinity of Cong Dong - Cong Tay Island cluster or in the East of Ngoc Vung Island.

3.1.3. Morphological and geomorphic features of islands and island shores

The karst islands in Ha Long Bay - Bai Tu Long Bay create the unique landscape of “fossil karst islands repeatedly intruded and modified by sea water”. However, most of the inhabited islands, and therefore related to Van Don ATP, are “soil islands” and exist mainly in Bai Tu Long Bay. They have low mountainous topography, mainly below 300-meter-high above sea level (except for Nang Tien Mountain on Tra Ban Island (450m) and Van Hoa mountain on Cai Bau Island (397m)). These islands are generally narrow and extend in the general direction from NE - SW to NNE - SSW. The slopes of the two island sides are clearly different: The Eastern slopes of Sau Nam - Ba Mun - Minh Chau - Quan Lan Island series are very steep, and the cliffs are almost vertical and close to the Waterline while the Western slopes are quite graded [8]. That difference is partly due to the structural features and composition of the rocks that make up the Island, and partly due to modern marine dynamics. The Eastern shores of the out-

er barrier islands are composed of relatively straight and sloping terrigenous rock, affected by waves in four seasons, and there develop the cliff and rocky shore topographies. Particularly in the North and South of Quan Lan Island and Ngoc Vung Island, there are tombolos of early-middle Holocene age and the modern beaches. In contrast, the Western shores of the islands and the shores of the inner islands are less affected by waves than by tidal currents. Tidal accumulation forms are commonly seen, such as the tidal flats along the creek banks between Tra Ngo Lon and Tra Ngo Nho islands, the concave arc at the center of Ba Mun Island, and especially on the Northwestern side of Quan Lan Island.

At the foot of the islands, there are many muddy puddles and intertidal flats, or many narrow sandy and rocky beaches that are 30 - 70m wide and flooded by tides periodically. Some areas of hundreds of hectares have both muddy, sandy, and rocky beaches as well as deep places, beautiful landscapes, convenient for anchoring of ships and boats, such as Cai Quyt Lagoon, O Lon Lagoon, Lach Cong between Tra Ngo Lon and Tra Ngo Nho islands, and Cai De Lagoon. The most distinctive are Chuong Nep and Nhang Ria beaches in Minh Chau Commune and Son Hao beach in Quan Lan Commune. The sandy beaches in Minh Chau Commune are kilometers long and very flat and have fine white sand grains and smooth waves. In contrast, on the sandy beaches in Quan Lan Commune which are also very long and flat, the sand grains are coarser, yellow in color and the waves are stronger.

The bedrock, distributed on the islands of Sau Nam, Sau Dong, Ba Mun, Tra Ngo Nho, and the mountainous part of Tra Ngo Lon Island, is the terrigenous rock of the Do Son formation. The rest, including most of Tra Ngo Lon Island and rocky islands scattered in Bai Tu Long National Park, such as Dong Ma, Hon Chinh, Lo Ho, Mang Ha Nam, Mang Ha Bac, Di To, Chay Chay, Da Day, and Soi Nhu..., is mainly limestone. Thus, Tra Ngo Lon Island has a unique geological structure. More than one-third of the islands in the North are “soil island” on the terrigenous rock base. The rest in the south is “rock island” with karst terrain with many caves and valleys. Due to the encroachment of the sea, these valleys form lagoons in the center of the mountains, creating unique and attractive landscapes.



3.2. Marine transgression-recession events from the plate of Paleolithic period until now

Perhaps a shortcoming in the current interpretations of Van Don ATP system is that the connection with changes in the natural conditions of the area, especially the recent marine transgression-recession is not considered. Below are some of these changes:

Late Pleistocene Interglacial and Glaciation periods (130 - 11.7 Ka.): In the late Pleistocene, the Last Interglacial (130 - 110 Ka.) occurred, followed by the Last Glaciation (110 - 18 Ka.), including the Last Glacial Maximum (LGM, 26.5 - 18 Ka.). At the end of the LGM, transgression started. The sea level, which was about 120m lower than today, gradually increased (-120m approximately 18 Ka.; -20m approximately 10 Ka.). Alluvial deposition (aQ_1^3), alluvial-marine deposition (amQ_1^3), and marine deposition (mQ_1^3)... were formed.

Early Holocene continent (11.7 - 8.2 Ka.): During the early Holocene, the transgression continued, forming alluvial deposition (aQ_2^1), alluvial-marine deposition (amQ_2^1) and marine-bog deposition (mbQ_2^1) (the Hai Hung formation, lower part).

Middle Holocene maximum transgression (8.2 - 4.2 Ka.): The sea level rose about 4 - 6m higher than today in the first half, then maintained and lowered gradually in the second half. Middle Holocene marine deposition in the lower part ($mQ_2^{2,1}$) and marine, alluvial-marine deposition in the upper part ($amQ_2^{2,2}$) and ($mQ_2^{2,2}$) (the Hai Hung formation, upper part) were formed.

Regression after the Middle Holocene maximum transgression (4.2 - 2.5 Ka.): Sea level lowered to about - 4m lower than today.

Late Holocene transgression (2.5 - 1.5 Ka., ending around the 5 - 6th centuries): The sea level rose to about 1.5 - 2m higher than today. The Thai Binh formation ($Q_2^{3,2}$) was formed.

Regression in the latter half of late Holocene (1.5 - 0.5 Ka., ending around the 16th Century): The sea level lowered to about 1 - 2m lower than today.

Modern transgression, from about 500 years ago to the present [7].

Natural characteristics and conditions, including the changes mentioned above, will be related and explained in the following sections of the report. Moreover, the authors also support the idea that many signs and premises for the "official" formation of Van Don ATP, or in other words the "precursor" of Van Don ATP, date back to the period that is much earlier than the time King Ly Anh Tong established "Van Don site" in 1149.

3.3. Some signs and premises of Van Don ATP in prehistoric times

3.3.1. Soi Nhu culture (about 18,000 - 7,000 years BC)

Soi Nhu culture [3], named after the archaeological site Soi Nhu in Bai Tu Long Bay, is the prehistoric culture discovered by Vietnamese archaeologists in 1964 and excavated in 1967. Soi Nhu culture concentrated mainly in Ha Long Bay and Bai Tu Long Bay. It is believed to be

the Late Paleolithic - Early Neolithic culture and the most ancient known in the area [3].

Typical archaeological sites of Soi Nhu culture were found in Me Cung, Tien Ong, and Thien Long caves. They prove that the owners of Soi Nhu culture in general lived at the same time and had the same evolutionary level as the famous Hoa Binh and Bac Son cultures and initially had signs of adaptation to the coastal life. This has added to the prehistoric picture of Vietnam with a highlight, a new basis for explaining the development path of Cai Beo culture and then Ha Long culture - the marine cultural path for the Northeast region of Vietnam of which the main orientations were marine exploitation, including fishing as well as exchange, trading, and development of a number of handicrafts such as making pottery, stone tools, jewelry, and especially boat building [3].

3.3.2. Cai Beo culture (7,000 - 5,000 years BC)

Cai Beo culture was the bridge between Soi Nhu and Ha Long cultures [3]. Typical archaeological sites of this culture were found in some rock shelters and caves in Ha Long Bay such as Cai Beo, Ha Giat and Giap Khau... Cai Beo culture is depicted most typically at Cai Beo archaeological site, first discovered by the French archaeologist M. Colani in 1938. Several subsequent excavations by Vietnamese archaeologists in 1972 - 2006 identified three cultural layers, two lower layers are classified in Cai Beo Culture and the upper layer is of Ha Long culture. The appearance of wildlife teeth and marine fish bones shows that Cai Beo people used to specialize in hunting, gathering, and fishing. In the period of Ha Long culture, residents developed cultivation and built boats to go out to the sea, more deeply adapted to the marine environment.

3.3.3. Ha Long culture (5,000 - 3,000 years BC)

In 1937 - 1938, archaeologists M. Colani (France) and G.J. Anderson (Sweden) discovered traces of prehistoric people along the shore of Ha Long Bay such as Ngoc Vung, Tuan Chau, and Cai Dam islands... So far nearly 50 monuments of "Ha Long culture" have been discovered on the islands as well as along the coast in Ha Long Bay. During that time, Ha Long ancient people lived mainly in "villages" on sand dunes, sandbanks, estuary tidal flats, and along the coast; only a few lived in caves. Stone tools



and pottery are typical of the culture of Ha Long ancient people, including porous ceramics of Ha Long coast that were made from crushed mollusk shells mixed with sand and Earth and decorated with wave patterns on the outside - bearing the influence of the sea. Archaeologists believe that the ancient Ha Long people must have created many means of water transportation for fishing and exchanging products with other regions. Ha Long culture has indigenous origin and is the result of exchanges with other cultures. Ha Long culture is essentially a marine culture, one of the four prehistoric marine cultures in Vietnam [3].

3.3.4. Some signs and premises of Van Don ATP in the Northern domination period

The premises, signs, and evidence of Van Don ATP system, both in reality and in the documents, have been mentioned by many domestic and international historians and archaeologists. Recent studies, especially those of international experts on Vietnamese studies and using early Chinese written materials, show that the territory of Vietnam (Giao Chau) used to have an important position in the maritime trade routes in the East Sea [4,5].

During the Dong Son culture period and subsequent historical periods, receiving the tradition of a dynamic and adaptable marine culture, a part of ancient Vietnamese inhabitants continued to maintain and develop their close relationship with Southeast China, but gradually expanding relations with Hainan, Taiwan, Japan, North Korea and other maritime cultures in East Asia, spreading the wet rice culture, bronze drums, tattooing, stilt-house living..., contributing to the creation of specific nuances of ancient Japanese culture. These diverse exchanges contributed to the formation of a "marine culture" which had boldly Austro-nesian elements and was one of the origins of Vietnamese culture [5].

Early written historical sources of China show that during at least the first three centuries of the Northern Colonial period, Giao Chau, with Long Bien prefecture, acted as a coordination center of China's maritime trade in the East Sea, and formed a regular trade route connecting Guangzhou with the trading centers in the Northwestern Gulf of Tonkin. From the middle of the third Century, the Northern Delta region could no longer maintain its position in the regional maritime trade system [4].

According to Mr. Nguyen Van Kim, under the rule of the Eastern Han Dynasty (25 - 220), the economic relationship between Giao Chau and Nam Hai region was quite developed and became prosperous in the Tang dynasty (618 - 907). As the gateway to the sea of Southern China, the Gulf of Tonkin of which the center was Van Don Trading Port was considered the main trade route connecting the continent with the ocean. Van Don was not only at the center of East - West exchanges but also the place of convergence of North - South relations. The author cited several historical sources (the book Lingwai Daida records about the reign of King Dinh Tien Hoang, Le Long Dinh, and Ly Cong Uan and the battles of Ly Thuong Kiet in 1075 - 1076...) showing that the main exchange activities between China and the South were conducted through the sea routes through Van Don area. The author remarked that although it was not until 1149 that the Ly Dynasty established Van Don site for trading and for foreign traders' accommodation, in fact trading activities between Dai Viet and other countries in this area must have taken place much earlier.

The monuments of Van Don ATP at Cong Ong - Cong Ba, especially the Han tombs of the Northern Colonial Period - Da Bac ancient tombs - also contribute to affirming the important position of this area even before Van Don Trading Port was established.

Regarding the above comment of scholars that "the Northeastern sea route of our country has been studied very specifically and in detail by the Chinese", the authors also believe that not only the Chinese but the Vietnamese people at that time also knew this sea thoroughly. They applied their knowledge not only in their daily lives but also in domestic and international trade and exchange, even in the resistance wars against foreign invaders. They certainly inherited that tradition from much earlier cultures.

4. DISCUSSING THE RESEARCH RESULTS

4.1. The center of Van Don ATP system - from the perspective of natural characteristics and conditions

An interesting detail that has been mentioned by many researchers is the question of the central location of Van Don ATP. Some assume that it must be Cai Lang, others think that it must be Cong Dong - Cong Tay Island cluster. According to Mr. Nguyen Van Kim [5], the central area of Van Don ATP consisted of 3 sub-zones. Sub-zone 1 included Cong Dong - Cong Tay Island cluster that was the largest economic, cultural and diplomatic center of Van Don during the Ly - Tran dynasties. Sub-zone 2 included Hai Van Island clusters which played an important role in protecting security and controlling tariffs, ensuring the handover and trade of high-class products of sub-zone 1 and at the same time enabling economic exchange activities with the outside world. From about the end of the 15th Century to early 16th Century, replacing the Cong Dong - Cong Tay area, this sub-zone gradually emerged as the largest and most important center of Van



Don and continuously maintained that position until about early 18th Century. Sub-zone 3 included other wharfs in Ngoc Vung Commune, both playing the role in international trade and ensuring security in the South for the Trading Port. All three sub-zones combined played the most important role in political, economic and social activities during the seven centuries of establishment and development of the Van Don ATP system.

Not mentioning the second and the third zones of Van Don ATP that are outside of the present Van Don Island District, the following will further analyze the role of sub-zone 1 and sub-zone 2 of the central zone from the perspective of natural features.

First, both opinions are derived from an initial description mentioned in history literature "... in the sea, at the place where two mountain ranges face each other and a strip of water flows in the middle, wooden barriers are set up as a sea gate and people's houses are built along the shore..." The authors of this article find that both locations, Cong Dong - Cong Tay and Cai Lang - Quan Lan, appear to be suitable.

The second argument is that ceramic artifacts from the Ly - Tran dynasties and copper coins of Tang - Song - Yuan dynasties... were found in Cong Dong - Cong Tay Island cluster. However, similar findings by Japanese scientist Yamamoto Tatsuro (cite in [5]) in the area of Con Quy - Cong Cai - Cai Lang wharfs show that this argument is not persuasive. The next argument that the cultural layer in Cong Dong - Cong Tay containing artifacts of the Ly - Tran period is thicker and richer while the main cultural layer in Cai Lang - Quan Lan contains younger artifacts of the Le - Mac - Nguyen periods perhaps is not convincing.

Another argument is that in the area of Cong Dong - Cong Tay Island cluster, there are many relics of pagodas and towers... of the Tran dynasty and it was therefore more densely populated, which, in addition to vibrant trade activities, makes it more suitable as a cultural-administrative center. Next, the area has a place named Vung Huyen, which may be related to the seat of a district, and thus more appropriate for the role as an administrative center of the Trading Port (however, this event, if any, didn't happen until about the 18th Century). The monuments in the Cai Lang - Quan Lan - Con Quy - Cong Cai area... are certainly ports and wharfs, but they also had the functions

of outposts, inspection, supervision, customs, and taxation... However, in the following centuries, the central role of Van Don Trading Port was transferred to Cai Lang - Quan Lan on the grounds that several communal houses were built there and replaced pagodas as the place where the main cultural activities of the community took place.

According to the authors of this article, although the above analyses seem reasonable, the clear "definition of roles, functions, and tasks" as above probably does not contribute to affirming the central position of Cong Dong - Cong Tay Island cluster in Van Don ATP system in this area. If other details are considered, such as:

Monuments of Han tombs before and at the beginning of the first Century AD on Cai Ban Island, Da Bac Village, Minh Chau Commune.

Ly Thuong Kiet's military campaigns along Dong Kenh River in 1075 - 1076 against the Song invaders.

The fact that King Ly Anh Tong set up Van Don site in 1149 could only happen in relation to Van mountain, Van garrison... on Van Hai Island cluster.

The victory of Van Don on Mang River of Tran Khanh Du in 1288... then Mang River and the monuments along it seem to have been known earlier and used for more diverse activities than on Cong Dong - Cong Tay Island cluster.

Furthermore, back to the original description of the Trading Port's location on "... set up wooden barriers as a sea gate...", a natural question is that if those barriers had not been set up there for customs, border guards, taxation... then what would have been their roles? If so, would the location on Mang River have been more appropriate? Given the foregoing, the authors argue that it may not be so important to find a single location with the central role of Van Don ATP system as well as to argue about the shift of that center from time to time. Given the distance between two places - Cong Dong - Cong Tay and Cai Lang - Quan Lan - Cong Cai - Con Quy... - was not too far from each other and traveling was not too difficult, considering both places as the center of the ATP system is not too unreasonable.

For the monuments on Van Hai Island cluster (Cong Dong, Cai Cong, Con Quy, Cong Cai, Cai Lang, and Quan Lan...), some observations below from a geological-geomorphic perspective can contribute to explain why the ancient people chose this area as a trading port:

The development of a fault zone in the NNE - SSW direction along which the Mang River lies and flows depending on the tide and the large space were probably suitable for building an outpost here for military and immigration control, even for setting up a "site" for population gathering, trading and foreign traders' temporary residence.

The fact that terrigenous rocks created soil, enabling the formation of thick vegetation, storing fresh water, and at the same time storing groundwater in cracks, fracture zones... is clearly one of the most important criteria. A range of freshwater wells scattered on both banks of Mang River proves this statement.



Van Hai Island cluster along the Eastern edge helps to shield all ports and wharfs in this area from winds and storms. Similarly, the intersection between different fault systems and fault zones also facilitated the formation here of land-locked lagoons, which are convenient for mooring boats and ships.

At first, perhaps the area that is now the center of Quan Lan Island Commune, even the tombolos connecting Minh Chau - Quan Lan islands, did not exist. Cai Lang Wharfs faced small islands scattered in all three directions, creating a relatively closed lagoon to the South convenient for boats to anchor. Only a few centuries later, due to sedimentation, Cai Lang wharf became shallow while the tombolos made Quan Lan gradually larger and more attractive for development activities.

If the sea level was about 1.0 - 1.5m lower than today when King Ly Anh Tong established Van Don site in 1149, then the factors of current, tide, width of Mang River, and distance between the islands... were even more favorable for the development of ports and wharfs in this area...

Similarly, for the area of Cong Dong - Cong Tay islands, the following comments from a geological-geological perspective can help explain why the ancients chose this area to build wharfs, headquarters, and places to practice religious rites:

The development of a NW - SE fault has split the two islands Cong Dong - Cong Tay and widened the Northern end of Cong Dong Island. The fault itself has also deeply penetrated the bedrock, enabling sea water to flow in to form Cong Dong River (or Thua Cong River) - sea creek which was deepest in the middle (up to nearly 10m) and gradually shallower towards two ends (only about 5 - 6m). This sea creek and Cong Dong - Cong Tay islands themselves were also further divided by a system of faults and small rupture zones in the NE - SW direction, creating a series of small sea lagoons deeply encroaching in the two islands. The position of the two islands also contributes to screening off winds and storms... These characteristics combined made Cong Dong - Cong Tay Island cluster an ideal port system for ships and boats.

Sandstone, siltstone, and claystone, the main composition of the Duong Dong formation, have weathered into a thick layer of soil, facilitated a good vegetation cover and helped to retain rainwater, surface water, and groundwater, which is a prerequisite for people to live and the most important factor for ships to stop by to replenish water on voyages of weeks and months long. Of the thousands of islands in Ha Long Bay - Bai Tu Long Bay, most are karst islands, only a few are "soil" islands. Thang Loi Commune also has hundreds of islands but only about a dozen soil islands and the two islands Cong Dong - Cong Tay are the only places inhabited because of this factor.

The maximum Middle Holocene transgression (about 8.2 - 4.2 Ka.) left on the two islands a flat abrasive terrace at an altitude of about 5 - 6m, which was also a favorable condition for the construction of houses and human works.

The intersection between the above - mentioned NW - SE and NE - SW fault systems also contributed to the creation of several relatively flat expanses which were later exploited by humans. Places with high terrain and good feng shui (for example, leaning against the mountain, streams on both sides to provide water, not being affected by natural disasters...) were used for building pagodas or towers while places with low terrain close to the sea were suitable for making wharfs for ships to anchor. Other locations (for example, on the North side of Cong Dong Island) where mud and sand accumulated, were renovated by ancient peoples to make rice fields...

Some locations with exposed bedrock along the shore or near the middle of the creek were used by the ancients to make wharfs, load and unload, and gather goods...

In general, Cong Dong - Cong Tay Island cluster was almost in the center of the coastal-island zone of Bai Tu Long Bay and the Northeastern sea in general, at the sea crossroads between the international seaport Hon Net and Cua Ong port and coastal inland waterways. It was an ideal location to go to Minh Chau - Quan Lan and Ngoc Vung Island communes and further to Co To Island District - Tran Island, or to large coastal ports in Cai Rong Town, Cam Pha City, and Ha Long City.

Similarly, if the sea level in this area in 1149 was about 1.0 - 1.5m lower than it is now, then Cong Dong River might be even narrower; the wharfs positions may even be completely exposed on the water surface, the travelling between the two islands, the anchoring of boats, the concentration of population, and the practice of religious and administrative rituals... could be much easier than today...

Finally, the above-mentioned features along with the 20 - 30m deep sea creeks around Cong Dong - Cong Tay Island cluster and its vicinity may have been the main natural elements that contributed to determining the location of Hon Net international seaport.

4.2. Influence of natural conditions on the tradition of fishing and using sea of the Vietnamese and the decline of Van Don Trading Port system

Along with the establishment and development of Van Don ATP system, its decline was also mentioned by the same researchers mentioned above [4, 5] almost from political-economic-social aspects. The question is whether natural features and conditions, or more precisely, their fluctuations and changes, had any role in the decline of Van Don Trading Port system. The section below attempts to identify the effect of natural geographical-geological conditions on the tradition of exploiting and using the sea of Vietnamese people in general and the decline of Van Don Trading Port system in particular.

In the structural - tectonic context of the Northeastern coastal region as a part of the Dong Trieu arc as mentioned above, entering the neo-tectonic stage (about 65 Ma. up to now), the block lifting and lowering activities, erosion, outwash, accumulation... have begun to shape today's scene. Particularly, the formation of the East Sea subsided depression started from about 32 Ma. contributed to the formation of coastal structural depressions, later together with other exogenous processes forming a system of islands and creeks along the northeastern coast. However, the landscape as we see it today was mainly shaped in the continental context before being invaded and transformed by the sea many times. The islands were formerly the tops of mountain ranges and mountain blocks while the sea creeks were formerly crevices, canyons, and tectonic valleys between mountains, ancient flows... Most of them

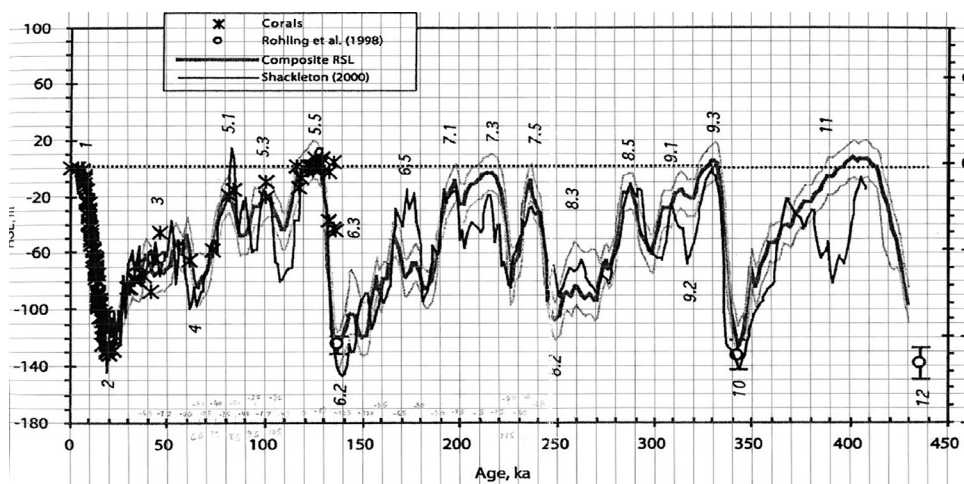
also were developed in the general structural direction of the area. The "monocline uplift" structure has contributed to the formation of "soil islands" on the easternmost edge and most of the "rocky islands" in the center of Ha Long Bay - Bai Tu Long Bay now.

In the past, many transgressions-recession events have occurred. In Figure 1, data on relative sea level (RSL) [6] is aggregated and compared. The results show that the sea level rose and fell many times during that period but rarely exceeded the current sea level. However, the most interesting part of the chart is the sea level fluctuations from about 20 Ka. BP, i.e., late Pleistocene - Holocene, corresponding to the late Paleolithic and the entire Neolithic.

In the part below, the sea level fluctuations (regardless of modern tectonic movements) of this period are mapped with prehistoric cultures in the Northeastern coastal strip of Vietnam as well as other changes in the political, economic, social and cultural life of Dai Viet in general and Van Don ATP in particular.

About 11.7 Ka the sea level was about 60 - 50m lower than today. The Soi Nhu culture (20 - 9 Ka.) coincided with the end of the Last Glacial Maximum and the beginning of the transgression. The mean rate of

rising water was about 10mm/year, from about -120m (18 Ka) passing -60m to -50m (11.7 Ka) then up -30m (9 Ka). At the end of the Soi Nhu culture (about 10 - 9 Ka.), the Gulf of Tonkin was shallow and ramp, the coastline was only about 10 - 20km from the mainland. It was entirely possible to forage from the sea and sea began to have some certain influence on this culture; however, the possibility that prehistoric people at that time in this area followed the sea to Japan as hypothesized by Wilhelm G. Solheim above) is remote. It is more likely that prehistoric humans in the islands in South-east Asia did that.



axis: Composite RSL curve (bold gray line) and associated confidence interval (thin gray lines). Crosses: coral reef RSLs. RSL low stands estimated by Rohling et al. (1998). Right axis: variations in mean ocean water $\delta^{18}\text{O}$ derived by Shackleton (2000).

▲ Figure 1. Comparison of relative sea level (RSL) fluctuations estimated by Rohling et al. (1998) [6] (left vertical axis, unit: meter (strong black line), and confidence intervals (thin gray line)) with mean oxygen-18 ($\delta^{18}\text{O}$) isotope variation in seawater (right vertical axis) calculated by Shackleton (2000) [cited in 6] about 450 Ka. BP. Multipliers represent relative sea levels defined from coral reefs. The small circles represent low sea levels estimated by Rohling et al. The dotted line is the current sea level.



Middle Holocene transgression continued in the period 9 - 7 Ka at the same time with Cai Beo culture. Sea level continued to rise from about -30m to -10m. Sea water came close to Quan Lan - Minh Chau islands, forming a shallow lagoon between these islands and Co To - Tran Island cluster, turning them into an archipelago. The strip from Quan Lan - Minh Chau islands to Cai Rong was basically mainland. In the South, in the present-day Cat Ba - Do Son Island area, the sea also encroached and flooded the bay between these two places. However, in general, the landscape of Ha Long Bay - Bai Tu Long Bay at that time was probably similar to that of Hoa Binh and Bac Son areas now with karst towers and cones rising above the valleys and corrosive plains... Some small creeks in Bai Tu Long Bay today are at a depth of > -10m, even up to -30m, but perhaps then they were only inland flows; Mang River was just a river (maybe even just two streams flowing in opposite directions from the area of Con Dam, Con Sang, and Soi Sat Isle). But with the sea encroaching close to Quan Lan - Minh Chau islands, about 10km from the mainland (Cai Rong Town), sea element become much bolder in Cai Beo culture.

Ha Long culture (5 - 3.5 Ka.) existed at the right time when, and right after the Middle Holocene transgression reached its maximum (8.2 - 4.2 Ka.), remained at about 4 - 6m higher than today and began to lower. In the first half of this period (8.2 - 5.5 Ka.), the sea level rose from a depth of about -10m to about 6m higher than today. The part above the water of the islands/island clusters became smaller, the lagoons became deeper and Mang River became a creek that was wider and deeper than it is now. In the South, the transgression flooded the area that is now Hai Phong and its surroundings. The coastline was the widest in the Holocene and prehistoric humans had to move inland. In the second half (5.5 - 4.2 Ka), sea level began to lower at a rate of about 5.5 - 5.0mm/year. At the end of Ha Long culture, it was still about 1.5m higher than today. The sea level continued to drop at the rate mentioned above until about 2.5 Ka. to a depth of about 4m lower than today. Despite the fluctuations, the sea remained with the Northeastern coast although it was shallower, and the surface area was smaller than today. On the common background of the shallow sea, a system of relatively deeper sea creeks formed and developed in the general

structural direction of the area and some estuaries. Mang River sea creek again became a river (or two small streams flowing in opposite directions). Combined with the system of outermost island series that acted as a shield against storms, these factors made coastal navigation in this area relatively convenient. Not to mention that the processes of transportation and sedimentation of sand in that context also resulted in tombolo - sand dunes connecting islands - causing some clusters of small islands to gradually combine to become larger islands more convenient to life (for example, Ngoc Vung and Quan Lan islands mentioned above). Thanks to those favorable factors, the prehistoric people and later the Vietnamese people adapted to the sea, conquered new lands, and began to develop a true marine culture. The "precursor" parts of Van Don ATP system probably started there or at least 2,500 years before this system was officially formed in 1149.

About 2.5 - 1.5 Ka. (about 500 BC to the 5 - 6th centuries) corresponding to the late Holocene transgression, the sea level rose about 1.5 - 2m higher than today, the speed was about 6mm/year. About 1.5 - 0.5 Ka. (from the 5 - 6th to the 15 - 16th centuries) corresponding to the regression in the second half of late Holocene, the sea level was lower than today by about 1 - 2m, the speed was about 4mm/year. In the South, Bach Dang estuary existed as a delta estuary, accreting rapidly both in the Northeast and Southwest of Do Son. Since then, it has been the modern transgression with sea level rising at a rate of about 3mm/year. Despite such sea level fluctuation, the sea stayed in the Ha Long Bay - Bai Tu Long Bay area. Mang River once again became a sea creek. In the area of Bach Dang estuary, about 700 - 500 years ago, although the sea level was still rising, alluvial deposits still prevailed. From about 500 years ago until now, transgressions here have become dominant, causing erosion. The ancient Vietnamese were used to the sea and no longer had to move inwards when the sea level rose, and marine culture played the dominant role in their lives in the Northern coastal region. In that context, the Tran family, belonging to the Bach Viet ethnic group living in the land of Min (Fujian, China), migrated south from 227 BC. After 700 years of living in Kinh Bac, the Tran family was divided into many branches, but in the primary line, Tran Tu Vien (582 - 637) emerged as a great talent of Giao Chau. The Tran family settled down and developed, even founded the Truc Lam Yen Tu Zen Lineage, and ended. All these events occurred in the regression context with new lands explored, but the sea has become an indispensable and integral part of Dai Viet in general and the Dong Trieu arc river and mountain system in particular.

Regarding the declined role of Van Don ATP system and the possible impacts of natural geographical-geological conditions, through investigation, survey and research, the authors basically did not find any features or conditions that were too negative in the Northeast coast. It is evidenced by the fact that the large deep-water ports, both international and domestic, such as Cai Lan, in the

former Cua Luc area, and Hon Net, in the vicinity of the Cong Dong - Cong Tay Island cluster, have been and are still being developed. However, there is a natural factor outside the distribution range of the Van Don ATP system that may have had a significant influence - the deterioration of the Duong - Kinh Thay - Bach Dang River system which was gradually replaced by Red River. The flow tended to gradually shift to the southeast to finally reach the current location of Ba Lat estuary. That is also the reason for the gradual decline of other trading ports in Duong Kinh and Tien Lang (Hai Phong). The authorities of other trading ports such as Hai Phong and Cat Hai (Hai Phong City) have been spending considerable expenses for dredging and stream regulation to ensure smooth operation. To some respects, it indicates the natural degradation of the Duong - Kinh Thay - Bach Dang River system as well as the Thai Binh River system in this area.

5. CONCLUSIONS

The formation and development of Van Don ATP system, officially from 1149 to the beginning of the 18th Century, especially under the Ly - Tran dynasties, and unofficially in the form of “precursory” parts of the system at least 2,500 years ago, are the clearest evidence of the tradition of exploiting and using the sea of Vietnamese people. The elements of “marine culture” began to appear from the last stage of Soi Nhu culture, grew stronger in Cai Beo Culture, became “true” in Ha Long Culture, and were further promoted in Dong Son cultures, throughout the Northern Colonial period and especially since Dai Viet became an independent sovereign state. The Vietnamese in ancient time and up to the modern period proved to be very knowledgeable about natural features and conditions, especially the geographical-geological characteristics and conditions of the “Dong Trieu arc” in the interaction with the sea and its variation cycles and know how to take advantage of this knowledge in all aspects of life, including maritime trading activities, both domestic and international.

The natural features and factors of the Northeastern coastal region did not play a significant role in the decline of Van Don ATP system. In contrast, that role was taken over by the fluctuations in the Red River - Thai Binh River system in relation to the operations of the Red River subsided depression and the Red river deep fault. This issue will be further elucidated in the following articles on the Vietnamese tradition of using rivers and water ■

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Experience of international car manufacturers in accessing sustainable products for circular economy development

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Abstract: After more than 350 years since the first steam-powered vehicle was invented in 1672, much has been changed in the automotive industry towards sustainable and environmentally friendly products. Nowadays, the development of a circular economy (CE) in the automotive industry has attracted the attention of many countries. The main objective of study is to understand how to approach sustainable products in the automotive industry and adapt to social needs. Through analysis and synthesis methods, the study analyzed international car manufacturers' experience in developing sustainable products. The results indicate that there is a trend of switching to electric vehicles in the policies of international car manufacturers, while car manufacturers also set policies and regulations in accessing sustainable products for the development of CE.

Keywords: Automotive industry; sustainable development; circular economy.

JEL classification: F64, K32, Q01, Q56.

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1. INTRODUCTION

Based on the naturally evolving needs of the automotive industry, the transition products powered by internal combustion engines are being replaced and towards electric vehicles (EVs). Strict vehicle efficiency and/or CO₂ standards have driven electric vehicle (EV) adoption in most of the leading EV markets. Countries are looking to accelerate the transition to EVs. In the 2022 report on EVs by the International Energy Agency (IEA), the average CO₂ emissions generated during the production of battery EVs was 5.4 tons. In terms of legislation, zero-emission vehicle policy and goals are enacted by many countries, for example: An executive order in the United States in August 2021 sets new ambitions for EVs, which will account for 50% of sales of light vehicles (LDVs) by 2030; or in October 2021, an announcement of an ambition to achieve 100% zero-emission LDV sales by 2035 in Chile. Additionally, in Canada, a new target is to achieve 100% zero-emission LDV sales by 2035 instead of 2040. New interim targets for 20% zero-emission LDV sales by 2026, vision reaching 60% by 2030 has also been set.

The relationship between the automotive industry and the supply of raw materials is one of the main challenges and obstacles (Buruzs and Torma, 2017). Lithium-ion batteries are a common source of power for clean technologies such as EVs. These batteries are a key part of current efforts to replace gas-powered cars that emit CO₂ and other greenhouse gases. In recent research by the Massachusetts Institute of Technolo-

gy (MIT), the emissions generated during the production of the 80kWh lithium-ion battery found in the Tesla Model 3. In Europe, more than 12 million light vehicles plus 1 million heavy and off-road vehicles (HDORs) reach the end of their life each year (Michael et al., 2018). The European Union is working to meet carbon emissions reduction targets as part of the Fit for 55 in 2030 package. Remanufactured parts have up to 80% less new materials and up to 50% less CO₂ emissions to produce than a new part, which is great for sustainability, affordability and customer choice.

Overall, EVs remain the key technology to decarbonize road transport with around 16% of global emissions. Therefore, Government spending on electric car subsidies is inevitable. In China, the electric vehicle (EV) industry subsidy program until the end of 2022 (from the previous expiration date in 2020) is extended. The purchase tax exemption policies for EVs continue until the end of 2023. In Japan, after doubling the subsidy amount in December 2020, the Japanese Government announced a budget allocation of 25 billion JPY (approximately US\$ 230 million) for Zero Emissions Vehicle (ZEV) grants.



2. DATA COLLECTION

Many previous studies are related to the approach to sustainable products for the CE development of the automotive industry. For example, the research by Martin et al. (2019) aims to identify the drivers and barriers to the implementation of a CE in the automotive industry of Pakistan. This research found that “profitability/market share/benefits” (30%), “cost reduction” (22%) and “business principles/environmental concerns/valuation high prices” (19%) were the top three drivers. Similarly, “ignorance” (22%), “cost and financial constraints” (20%) and “lack of expertise” (17%) are the top three barriers to implementing CE principles in the Pakistani automotive industry.

Another research by Gonzalo et al. (2020) shows that ecological innovation in products, processes and management has a significant positive impact on the CE of companies in the automotive industry. Research by Schulz’s (2021) analyzes the EV battery case at a German car manufacturer to explore the decision context for the CE. In particular, the factors that need to be developed related to the development of the CE in the automotive industry include Transparency, planning ability, integration process in product development and business culture. Or research by Simone Wurster (2021) provides a method to support the development of CE products, in which the application of software meets the global demand for more sustainable automotive tire products.

In addition, the research of Eleni et al. (2021) has clarified the reality of the application of CE models in production that allows the transformation from the “take-to-do” linear model to closed-loop economic models that reduce waste production. Establishing DigiPrime’s KPI Framework for the CE transition is critical to driving performance metrics across the automotive value chain. Research by Anne et al. (2022) finds that the transition to recycled plastics in the automotive industry requires a network of solutions that together create systemic change.

Recently, research by Syed, Saurabh and Qasim (2023) assesses the tendency of automakers to prioritize waste reduction, product management and asset analysis. It is essential to develop new strategies and

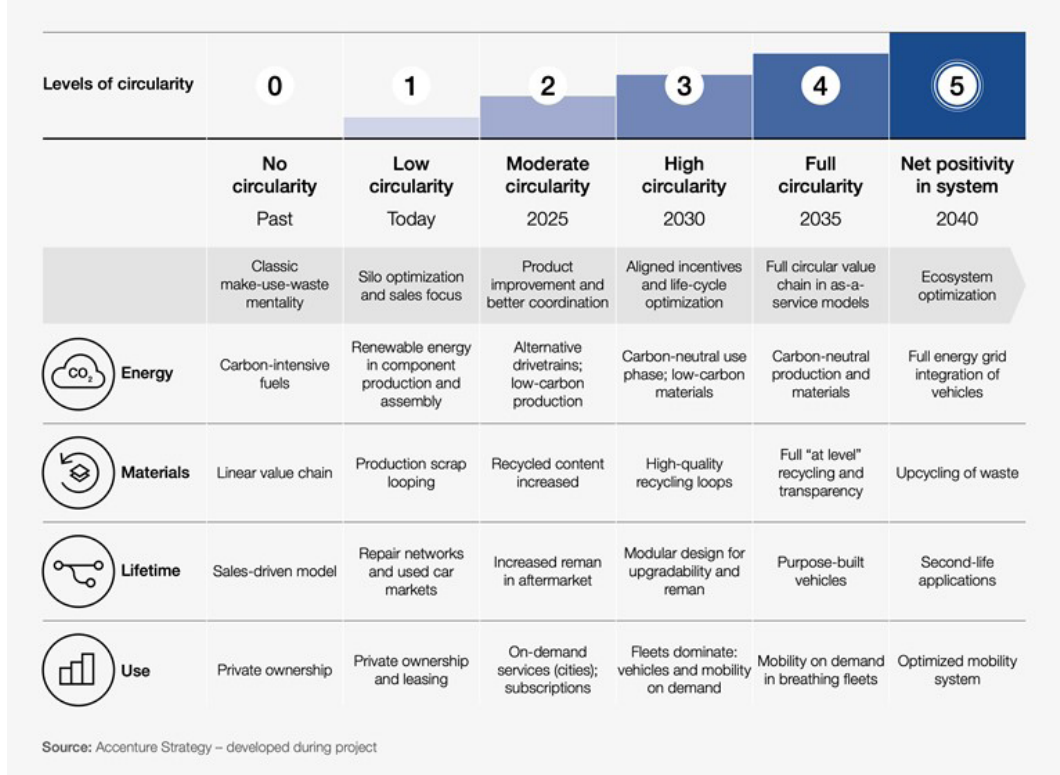
aspects related to machine tools through Industry 4.0 (I4.0). Through collected data statistically analyzed from 98 manufacturers and 296 end users, perceived factors affecting operational performance for the automotive industry CE-oriented in India. Research by Halia and Rayyan (2023) focuses on analyzing the automotive industry in the I4.0 based on the energy and fuel issues of cars, towards EVs. Based on an analysis of initiatives undertaken by the top 10 auto companies in the Fortune 500 List, the automotive industry must incorporate circularity in the transition to EVs, and I4.0 is seen as key motivators and facilitators. I4.0 includes biotechnology, materials technology, digitization state and information technology applications intelligence. Thereby proposing a method of implementing sustainable production through 2 levels for the entire life cycle of automobiles.

3. SUSTAINABLE PRODUCTS APPROACH IN THE AUTOMOTIVE INDUSTRY

The CE offers a solution to integrate sustainability across the automotive industry life cycle. In addition to the goal of minimizing emissions in manufacturing operations, adopting a sustainable products approach in the automotive industry will allow manufacturers to significantly improve profitability.

Car manufacturers are aiming to create decarbonizing vehicles for the green environment. During subsequent operation and depending on their power source, EVs can offset the higher CO₂ emissions that initially occurred during production. If one could only operate an EV using renewable energy sources, the CO₂ emissions compared with vehicles using an internal combustion engine would be reduced by up to 70% over its life cycle. To do this, setting environmental standards is highly recommended. Regulations require manufacturers to make vehicles lighter to be more energy efficient. The focus in the design phase is on making vehicles energy efficient, for example using lightweight materials such as plastic during service life, shifting the burden to the end of the life cycle where they must be recycled.

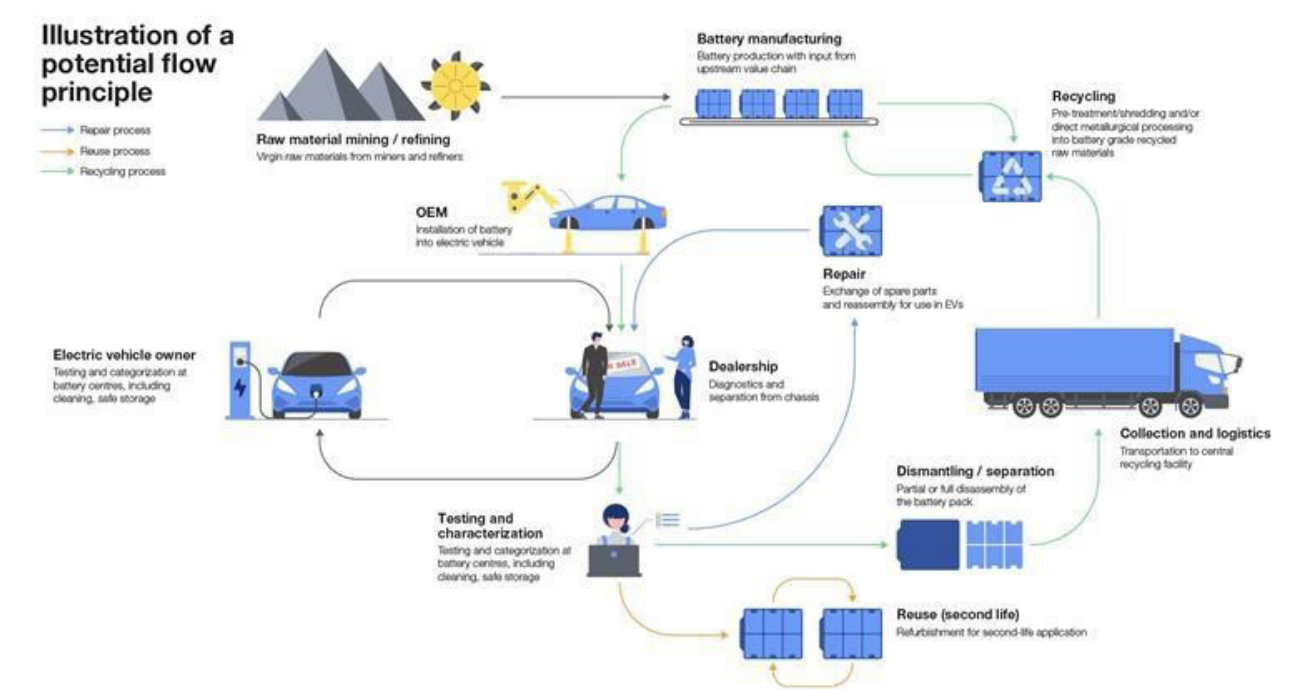
One of the ways to approach a sustainable product is to recycle automotive parts. Most countries in the EU have laid out plans for the automotive industry in Directive 2000/53/EC towards a CE by 2050, ELV Directive No. 2000/53/EC setting out the principled end-of-life management of light vehicles. Specifically, the directive establishes a minimum reuse and recycling rate of 85% of the vehicle’s total weight and a minimum reuse and recovery rate of 95% of the total weight. In the EU, the tire production process is promoted under the objective of CE. Combination of promoting the development of tire wear and mileage testing procedures, stimulating tire labeling and CE certification, and implementing media and advertising of high-quality tires Low PAH.



▲ Figure 1. Plan for the development of CE in the automotive industry in phases
(Source: Accenture Strategy, 2023)

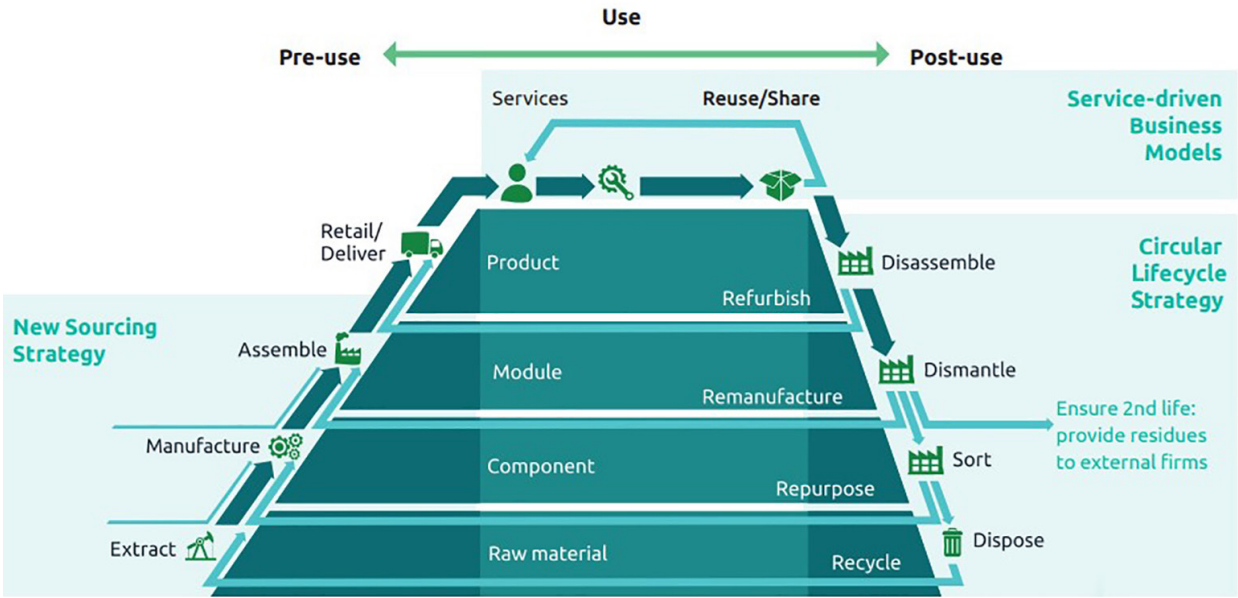
The main source of PAH emissions comes from exhaust fumes of fuel-using engines. When PAH is distributed in a wide range, there is a significant number of PAHs with high carcinogenic potential. With the wave created several other countries such as Japan, Korea, India and many US state governments have also introduced regulations on the requirements for recycling EV parts at the end of their life.

parts using materials that are easy to disassemble, recover and recycle at the end of the first life cycle; (2) Recycle the production scrap and return the waste material to the production loop; (3) Remanufactured defective parts.



▲ Figure 2. Battery circular value chain
(Source: World Economic Forum, 2022)

Recycling batteries provides to produce materials and is guaranteed to be environmentally friendly. To develop sustainable products, a linear to cyclical lifecycle transition in the automotive industry. Material circulation and life optimization can be achieved through reuse, remanufacturing and refurbishment. In which, there are 3 approaches: (1) Design



▲ Figure 3. Value hill target picture - circularity and service-driven business model for automotive (Source: Sebastian, et al., 2023)

4. EXPERIENCE OF FAMOUS CAR MANUFACTURERS IN THE WORLD ON CE DEVELOPMENT

In 2021, several major automakers have announced their ambitions to achieve an all-electric future. Famous car manufacturers in the world have built principles in applying corporate social responsibility in their operations. Specifically, the levels of deployment of EVs by international automakers for the CE are divided into four levels: At level 1, activities are geared towards reuse, refurbishment, and repair. At level 2, the implementation focuses on Remanufacturing and repurpose. At level 3, Recycling activities contribute to the development of the CE. At level 4, the operating process is mainly about waste management and recovery residual management.

Table 1. Electric vehicle product development plan of international car manufacturers

Automaker	Announcement date	Ambition
Toyota	2021	3.5 million annual electric car sales by 2030 and the rollout of 30 BEV models
Volkswagen	2021	All-electric vehicles to exceed 70% of European and 50% of Chinese and US sales by 2030, and by 2040 nearly 100% to be ZEVs
Ford	2021	One-third of sales to be fully electric by 2026 and 50% by 2030, with all-electric sales in Europe by 2030
BMW	2021	50% of vehicles sold to be fully electric by 2030 or earlier
Volvo	2021	Become a fully electric car company by 2030
Geely	2021	20% of car sales to be electric by 2025
Mercedes-Benz	2021	All newly launched vehicles will be fully electric from 2025
General Motors	2022	30 EV models and BEV production capacity of 1 million units in North America by 2025, plus carbon neutrality in 2040

(Source: International Energy Agency (IEA), 2022)

Toyota is an international car brand from Japan, established in 1937. In the corporate sustainability report, the company focuses on enhancing our long-standing 360-degree approach to 4R, including: Reduce, Reuse, Recycle and Recover. Along with that, Toyota set out the Toyota Environmental Challenge 2050 strategy, the Carbon Neutrality plan of the Toyota vehicle life cycle assessments. For example, Austria's new parts depot is carbon neutral by design [1]; Zero-carbon ventilation systems for new plant operations [2]; Decarbonizing our logistics activities in Europe [3]; Our journey to a zero CO₂ paint shop [4]; Hybrid demand drives transformation of Toyota in Poland [5]; TME installs a wind turbine and solar panels at HO [6]; In pursuit of Zero Purchased Industrial Water [7]... Besides, battery recycling activities provide for the material production process are also implemented by Toyota. More than 200 hybrid batteries recycled from Toyota Camry vehicles are being used as part of a renewable energy project in Yellowstone (Japan). At the same time, Ten batteries from the Prius cars are grouped together to store locally produced electricity from photovoltaic panels.



Volkswagen is an international car brand from Germany, established in 1937. Today, the Company reuses waste from production, logistics, workshops and technical development to produce high-quality materials. By 2050, the entire Volkswagen Group will be a CO₂-neutral company and around 70 new all-electric car models will be launched across the group by 2028. Volkswagen customers can actively purchase used and tested genuine spare parts, especially engines, transmissions and airbags, such as Takata airbag recall campaign [8]. In addition, related electronic devices containing valuable raw materials are also remanufactured in accordance with Volkswagen policy.

BMW is an international car brand from Germany, established in 1916. The Company establishes a specific policy in the reuse of auxiliary materials, specifically up to 50% in cast aluminum components; 25% in steel structures and 20% in thermoplastics. The BMW Group implements many corporate development policies towards a CE. In Indonesia, the Company, together with tire manufacturer Pirelli, launched the “Living Rubber” initiative, advocating for the long-term non-deforestation of natural rubber. Or in Chile, the BMW Group joined the interdisciplinary project “Responsible Lithium Partner” in 2022 by sharing scientific findings on the impact of lithium mining on water resources in the region [9].

Daimler AG is an international car brand from Germany, established in 1926, later merging the brands and officially becoming Mercedes-Benz Group in 2022. In recent years, the Company has focused on net carbon-neutral vehicle manufacturing activities. Many measures to enhance environmental protection and resource conservation are typical for the plant such as: the photovoltaic system on the roof of the hall meets about 30% of the annual electricity demand [10]. In addition, the business has specialized Mercedes-Benz used spare parts centers. The activity of these centers is to sell parts that are disassembled, recovered for recycling and reused-used tires can be reused as composites in road construction. At the same time, build a new digital system - OMNI plus ON. This eShop system can be used to order all spare parts and components online and put them through a rigorous remanufacturing cycle. As part of the “Ambition 2039” vision, Mercedes-Benz’s goal for its passenger cars is to deliver a new fleet of vehicles with zero net carbon over the next 20 years [11].

Table 2. Summary of the trend of switching to electric cars of international car manufacturers

Auto Company	Shifting to EV's	Goals	Circularity
Toyota Motors	Yes	30 battery EV models by 2030	All 4 levels: Yes
Volkswagen	Yes	Fleet electrified: 50% by 2030 100% by 2040	All 4 levels: Yes
Daimler (Mercedes-Benz)	Yes	2025 onwards all new vehicle architectures will be electric-only, with an all-electric alternative for every model the company makes.	All 4 levels: Yes
Ford Motor	Yes	100% passenger vehicles EV in Europe 2030; 40 - 50 % EV Mix (battery-electric, fuel cell, and plug-in hybrid vehicles) by 2030	Level 1: No Level 2,3,4: Yes
Honda Motor	Yes	100 percent zero-emissions sales by 2040	Level 1,2: No Level 3,4: Yes
General Motors	Yes	Thirty new global EV launches planned through 2025, 40 - 50 % EV Mix (battery-electric, fuel cell, and plug-in hybrid vehicles) by 2030	Level 1: No Level 2,3,4: Yes
BMW Group	Yes	All future new models from BMW be fully electric, MINI exclusively all-electric by early 2030s, Rolls-Royce all-electric brand from 2030 on	All 4 levels: Yes
SAIC Motors	Yes	100 new energy models with its partners by 2025 (includes battery EVs as well as plug-in hybrid and hydrogen fuel cell vehicles)	All 4 levels: Yes
China FAW Group	Yes	Partnering with Audi to build EVs in China	Level 1: No Level 2,3,4: Yes
Hyundai Motor	Yes	Offer ten electrified, eco-focused vehicles by the end of 2022	Level 1: No Level 2,3,4: Yes

(Source: Halia & Rayyan, 2023)

Mazda is an international car brand from Japan, established in 1931. In corporate development strategy report, Mazda aims to ensure carbon neutrality in its entire business by 2035, with a vision to 2050, the Company focuses on three aspects: (1) energy conservation, (2) transition to renewable energy and (3) development of carbon-neutral fuels for indoor transportation. Based on cooperation with suppliers and dealers, Mazda has established a system to promote sustainability initiatives throughout the entire value chain [12]. The move towards sustainable products is being taken seriously by the Company. Currently, Mazda processes waste from automobile shredders (ASR), chlorofluorocarbons and air bags. Recycling policy for end-of-life automotive products is followed. Mazda connects with businesses in the disposal of products from the end owner and transfers them to companies. In addition, the Company is preparing for the development of new technologies and measures to promote recycling programs.

CONCLUSION

The plans and policies to deploy electric vehicles are one of the orientations to approach sustainable products for the CE development of international car manufacturers. Besides, many related aspects are also taken into account such as recycling of auto parts (tires, airbags), battery recycling, and replacement of renewable energy sources. This is about balancing the 3Ps: People, Planet, and Profits.

“CE is a team sport”. It seems that no company implements the CE in isolation, the model approach in practice requires international car manufacturers to make policies in product design, business models, more comprehensive activities and partnerships in the future ■

Note:

[1] <https://www.toyota-europe.com/news/2023/new-parts-depot>

[2] <https://www.toyota-europe.com/news/2023/zero-carbon-ventilation-systems>

[3] <https://www.toyota-europe.com/news/2023/decarbonising-our-logistics-activities-in-europe>

[4] [https://www.toyota-europe.com/news/2023/our-journey-to-a-zero-co₂-paint-shop](https://www.toyota-europe.com/news/2023/our-journey-to-a-zero-co2-paint-shop)

[5] <https://www.toyota-europe.com/news/2021/hybrid-demand-drives-transformation>

[6] <https://www.toyota-europe.com/news/2020/tme-installs-a-wind-turbine-and-solar-panels-at-brussels-ho>

[7] <https://www.toyota-europe.com/news/2015/zero-purchased-industrial-water>

[8] <https://www.volkswagen.de/de/besitzer-und-service/ueber-ihren-auto/kundeninformationen/takata-recall/takata-airbag-recall-campaign-eg.html>

[9] <https://www.bmwgroup.com/en/news/general/2023/responsibility-in-supply-chain.html>

[10] <https://www.mercedes-benz.com/en/sustainability/environment/start-of-production-of-the-eqs-at-factory-56/>

[11] <https://www.mercedes-benz.com/en/sustainability/environment/the-eqc-is-this-sustainable/>

[12] <https://www.mazda.com/en/sustainability/about/>

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Assessment of ecosystem services based on i-Tree Eco model in the 29/3 Park, Danang City

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Abstract: Park trees serve an important role in giving environmental advantages to humans. The i-Tree Eco model is used in this study to analyze the value of trees planted in 29/3 Park in terms of carbon storage capacity, carbon dioxide sequestration, and runoff avoidance. A total of 2,331 trees calculated in the 29/3 Park are estimated to store about 122,540 kg of carbon, sequester roughly 24,490 kg of carbon dioxide, and prevent 518.4 m³ of runoff. The findings may be utilized to choose appropriate trees for future parks in Danang City to optimize environmental benefits.

Keywords: i-Tree Eco; urban tree; environmental benefits; carbon storage; Danang City.

JEL classification: Q56, Q57, Roo.

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1. INTRODUCTION

Green spaces play an important role in the urban ecosystem, providing people with a wide range of recreational, aesthetic, and environmental advantages. Trees, in particular, serve an important role in environmental preservation by improving air quality, removing pollutants and noise, protecting water and soil, and regulating microclimates. Assessing the environmental and ecological worth of each tree and green space is vital for providing critical information that improves public awareness, aids urban planning, and decision-making processes for local management (Bautista and Peña-Guzmán, 2019; Bertram and Rehman, 2015; Song et al., 2020).

Cities all across the globe have conducted quantitative studies to estimate the ecological merits of trees and green areas. The i-Tree Eco model, created by the USDA Forest Service and the Davey Institute, has grown in popularity, with more than 90 cities in 130 nations utilizing it to collect data on trees and air spaces in urban and woodland regions. The i-Tree is a free software package that includes i-Tree Eco, i-Tree Canopy, i-Tree Design, and i-Tree Landscape, all of which are particularly intended to assess the many advantages and values generated from trees. Since its initial release in 2006, the i-Tree Eco, particularly its i-Tree Eco tool, has grown in popularity due to its intuitive design, ease of use, and ability to provide critical insights about trees, such as carbon storage capacity, CO₂ sequestration, oxygen generation and the elimination

or absorption of air pollutants such as VOCs, SO₂, NO₂, CO, PM_{2.5}, and PM₁₀ (Nowak et al., 2018). Several studies have used the i-Tree Eco model to calculate the ecological and economic benefits of trees and green spaces. For example, a research done in the Luohe City, China resulted in 54,329 tons of carbon storage, 92 tons of air pollutants removal, and 122,637 m³ of runoff reduction. Another study in Dublin, Ireland, used the i-Tree Eco model to analyze urban air quality and discovered that trees in the City eliminated around 3 kg of PM_{2.5} dust each year (Riondato et al., 2020).

Danang is rapidly urbanizing, industrializing, and modernizing in order to become a centre of trade and education, as well as a vital gateway to Vietnam's Central highlands. This progression has resulted in tremendous socioeconomic growth achievements. However, as mentioned in the Environmental City Plan, the City needs aid in meeting its stated environmental goals. Despite a population of approximately 1.134 million people in 2020, Danang has a low green tree index of 7.51 m² per person. To meet its 2030 aim of 9.6 m² per person for green urban, the City must create green areas and carefully pick appropriate trees. This is an important phase in the planning and development of the City.

Previous research on trees and green spaces in Vietnamese cities has provided managers with vital information on the species composition and variety of planted trees (Hanh, 2015; Sang, 2018; Tan, 2019). In this study, we used the i-Tree Eco model to analyze the 29/3 Park in Danang City, with the goal of offering insights into the urban tree structure, as well as assessing the environmental protection and ecological benefits of the park's trees. This knowledge is critical for managers to successfully plan and develop green spaces in cities, making this a significant addition to the field of study.

2. MATERIALS AND METHODS

2.1. Study site

The 29/3 Park is located in Danang’s Thanh Khe District (16°03’46.8”N 108°12’20.6” E) (Figure 1). It covers an area of 19.4ha, of which approximately 10ha is covered by water. This Park serves as a venue for relaxation, entertainment, and cultural events.

2.2. Data collection

The study’s data were gathered using the grid technique in accordance with the standard i-Tree plot procedure (i-Tree Eco Field Guide Manual v. 6.0). Each standard plot has a circle with a radius of 11.3m and an area of 404.7m² measured in-

cluding the percentage tree. This study collected data on 372 trees from 36 plots, including tree location, species name, diameter at breast height (DBH) at 1.3m above ground level, total tree height, crown size (height) to live top, height to crown base, crown width, crown width, percent crown missing), crown health (dieback), and crown light exposure. Garmin GPSMAP 65 was used to locate trees; trunk diameter was measured at 1.3m ground level, canopy width was measured above using a tape measure, and tree height values were estimated using a Sndway Sw - 600A laser rangefinder (USDA, 2021). The research was conducted at the 29/3 Park in Thanh Khe District, Danang City, from October to December 2021.

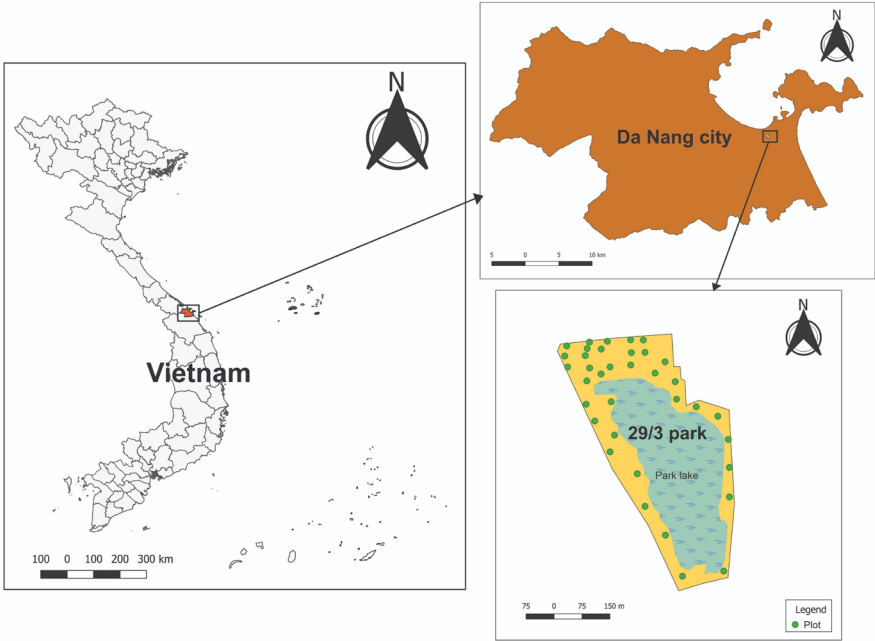
2.3. Data analysis

The i-tree Eco model v6.0.32 was used to import and compute data on trees at plots. Furthermore, data on precipitation, air quality, and local location were obtained from the i-Tree Database (<https://database.itreetools.org>). The i-Tree Eco model then will assess the value of 29/3 Park including tree structure and ecosystem services (Nowak, 2021; USDA Forest, 2021).

3. RESULTS AND DISCUSSION

3.1. The Park urban tree structure

The i-Tree Eco model indicates that there were around 2,331 trees at the 29/3 Park, with a total of 30 species belonging to 14 families and 10 orders. *Roystonea regia* (46.5%), *Cyrtostachys renda* (9.4%), and



▲ Figure 1. Map shows sampling plots in the 29/3 Park

Dracontomen duperreanum (7.0%) were the most common species. These three dominant species accounted for 62.9% of all tree counts. In terms of leaf area, *Dalbergia tonkinensis* was occupied with an average of 377m², followed by *Samanea saman* with 157m² (Table 1).

The distribution of tree sizes, as measured by diameter at breast height (DBH), was critical to the survival of a tree population. It has an impact on both present and future costs, as well as the flow of ecological benefits (McPherson, 1989). The stem diameter distribution for the ten most dominant species was primarily in the range of DBH less than 20cm. Only *Samanea saman* had a lower rate than 50%. This indicates that there are a lot of young trees, which might represent an increase in urban ecosystem services in the future.

Table 1. The dominant species and the value of tree-shading in the 29/3 Park

Species	Number of trees	Percent of population (%)	Leaf area (m ²)		
			Average	Total	% of Total
Roystonea regia	1,084	46.5	21	22,980	16.0
Cyrtostachys renda	219	9.4	5	1,150	0.8
Dracontomelon duperreanum	163	7.0	57	9,360	6.5
Samanea saman	132	5.6	157	20,670	14.4
Lagerstroemia speciosa	119	5.1	43	5,110	3.6
Hopea odorata	88	3.8	21	1,840	1.3
Dalbergia tonkinensis	75	3.2	377	28,240	19.6
Dipterocarpus alatus	75	3.2	44	3,330	2.3
Cocos nucifera	50	2.2	12	580	0.4
Delonix regia	50	2.2	89	4,460	3.1
Other species	276	15		46,180	
Total	2,331			143,900	

3.2. Carbon storage and carbon dioxide sequestration

The trees in the 29/3 Park were predicted to store 112,540kg of carbon, with a total value of stored carbon benefits of US\$ 23,015. The yearly value of the carbon dioxide sequestration was US\$ 4,601. *Roystonea regia* has the greatest carbon storage capacity of 68,480kg, with a yearly accumulation of 16,820kg. Meanwhile, *Samanea saman* exhibited the highest average carbon storage and sequestration of 123.4kg and 17.3kg, respectively (Table 2).

3.3. Hydrological effects of trees

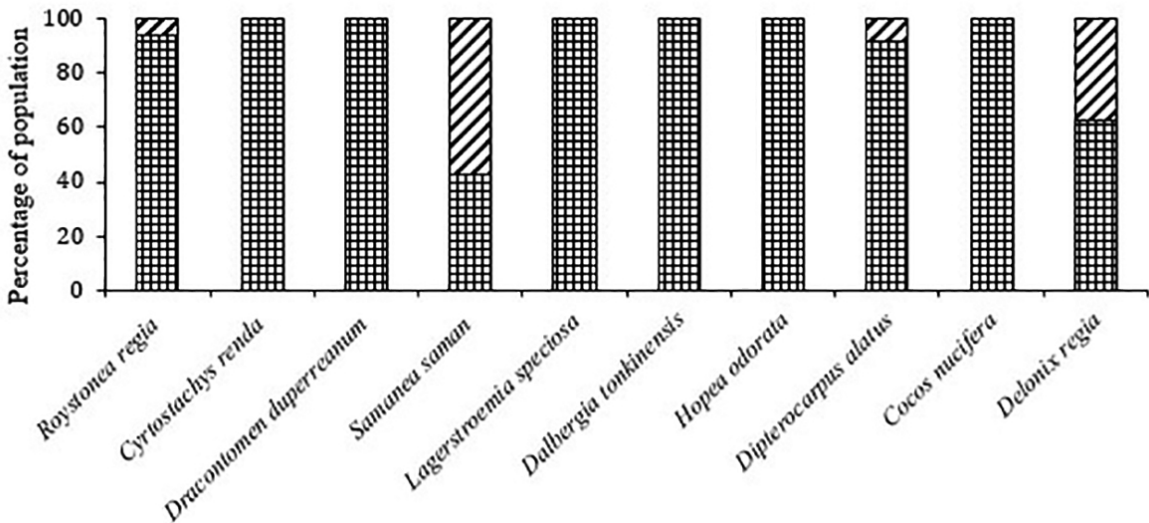
The total yearly value of water captured and runoff from trees in the Park increased by 2603.7m³ and 518.4m³ respectively. Despite having just 75 trees, *Dalbergia tonkinensis* achieved the greatest annual value for water interception and runoff prevention, with 510.8 m³ and 101.7m³, respectively (Table 3).

Table 2. Carbon storage and carbon sequestration

Species	Number of trees	Carbon storage			Carbon dioxide sequestration		
		Average (kg)	Total (kg)	Values (\$)	Average	Total (kg/year)	Values (\$)
R. regia	1,084	63.2	68,480	12,863	15.5	16,820	3,159
C. renda	219	2.6	580	108	1.5	330	62
D. duperreanum	163	7.7	1,250	235	2.8	450	85
S. saman	132	123.4	16,290	3,059	17.3	2,280	427
L. speciosa	119	15.2	1,810	340	6.2	740	138
H. odorata	88	12.4	1,090	205	5.6	490	93
D. tonkinensis	75	8.3	620	116	3.9	290	54
D. alatus	75	27.7	2,080	391	6.7	500	93
C. nucifera	50	30.2	1,510	283	7.6	380	71
D. regia	50	63.0	3,150	591	13.0	650	123
Other species	276	-	25,680	4824	-	1,560	296
Total	2,331		122,540	23,015		24,490	4,601

Table 3. The values of urban trees on hydrology rhythm

Species	Number of trees	Evaporation (m³/year)	Water captured (m³/year)	Prevented runoff (m³/year)	Prevented Runoff Value (\$)
R. regia	1084	411.1	415.7	82.8	195.2
C. renda	219	20.6	20.9	4.2	9.8
D. duperreanum	163	167.5	169.3	33.7	79.5
S. saman	132	369.9	374.0	74.5	175.6
L. speciosa	119	91.5	92.5	18.4	43.4
H. odorata	88	33.0	33.4	6.6	15.7
D. tonkinensis	75	505.2	510.8	101.7	239.8
D. alatus	75	59.6	60.3	12.0	28.3
C. nucifera	50	10.4	10.5	2.1	4.9
D. regia	50	79.9	80.8	16.1	37.9
Other species	276	826.6	835.7	166.4	392.4
Total	2331	2575.2	2603.7	518.4	1222.5



▲ Figure 2. The age structure of ten dominant species

3.4. Prediction of upcoming benefits

The i - Tree Eco model was used to forecast the benefits of trees in the 29/3 Park or the next 30 years (Table 4). The results reveal that all values increase, with carbon dioxide sequestration rising roughly five times and water interception increasing around 2.2 times. This means that the Park's environmental value will increase in the future.

4. CONCLUSIONS

The research examined the value of 2,331 trees in the 29/3 Park that provided environmental advantages in terms of leaf area, carbon storage, carbon dioxide sequestration, prevented runoff, and water interception. The study discovered that *Samanea saman* had the highest average carbon storage and sequestration, while *Dalbergia tonkinensis* had the highest yearly value for water interception and runoff prevention ■

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Table 4. The prediction of tree values in the next 30 years

Year	Environmental values			
	Carbon storage (ton)	Carbon dioxide sequestration (ton/year)	Prevented run off (m ³ /year)	Water interception (m ³ /year)
2022	1,225	25	518	2,604
2052	1,854	125	1,100	5,852

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Strengthening inspection, investigation, and supervision of hotspots to control environmental pollution in the Southern provinces

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In the past, the state management of the environment in the South has been strengthened with many positive measures and solutions and achieved some results such as: Effective organization the implementation of policy, legislation on environmental protection; Proactive and strict control of large waste sources; Monitoring, supervision, and timely grasp of developments of environmental issues, environmental protection work of objects of the type of production with high risk of polluting the environment; stepping up measures to prevent the risk of environmental incidents; maintaining the mode of coordination between the Central and local authorities in controlling, supervising and solving environmental polluting establishments and arising environmental hotspots; strict handling of violations of the legislation on environment; improved environmental quality; strengthened environmental and biodiversity monitoring, improved the capacity to warn and forecast on environmental quality, provided information on the environment; carried out solutions to protect and restore important natural ecosystems... However, there are still environmental pollution risks in this area that need to be addressed in the coming time.

INSPECTION AND INVESTIGATION OF COMPLIANCE WITH ENVIRONMENTAL PROTECTION LEGISLATION

In fact, the environmental inspection and investigation is considered as one of the effective tools of the state management of environmental protection. It has become a regular activity of the environmental management agencies at all levels, helping to detect, prevent, and promptly handle violations of environmental protection.

Every year, state management agencies on environmental protection at all levels conduct inspection of production, business, and service organizations. In particular, in the South, the Southern Sub-Department of Environmental Pollution Control, the Department of Environmental Pollution Control (DEPC), have inspected a total of 480 industrial parks and production, business and service establishments since 2016. The results of these inspections have led to administrative sanctions against 156 establishments, with fines totaling more than 45,854 million VNĐ. The DEPC has also investigated the implementation of inspection conclusions for 49 industrial parks and production, business, and service

establishments, resulting in administrative sanctions against 12 establishments with fines totaling 2,628 million VNĐ.

Currently, Decree No. 08/2022/NĐ-CP stipulates two new inspection and investigation activities: (1) Specialized inspection activities on environmental protection (Article 162); (2) Investigation of the compliance of the legislation on environmental protection (Article 163). Subjects of regular environmental protection inspection are organizations and individuals engaged in production, business and service activities of the type of production, business or service that pose a risk of polluting the environment at level I, Column 3 of the Appendix II promulgated together with Decree No. 08/2022/NĐ-CP, at the same time falling into the case of recidivism or repeated violations in accordance with the legislation on handling of administrative violations; period of regular inspection of an organization or individual is for 3 consecutive years in order to prevent, detect and handle violations; help organizations and individuals comply with the legislation on environmental protection.

Article 162 of Decree No. 08/2022/NĐ-CP also specifies the contents of responsibilities, investigation forms, competence to approve periodical investigation plans, investigation competence, investigation order and procedures and process of investigation results; the time limit for investigation at an establishment is regulated to be no more than 7 days from the date of commencement of conducting investigation at the investigated place; in the complicated case, the investigation scope is wide, the investigation time limit is 15 days; therefore, care should be taken during implementation to ensure compliance with regulations. In 2023, the Minister of Ministry of Natural Resources and Environment (MONRE) has approved a plan to investigate compliance with the legislation on environmental protection for production, business and service

establishments, especially in the South, it is expected to investigate 65 establishments in 5 provinces including An Giang, Ben Tre, Binh Phuoc, Soc Trang and Vinh Long. At the same time, the Southern Sub-DEPC has coordinated with the Department of Natural Resources and Environment (DONRE) of provinces to review and propose subjects when developing the annual inspection and investigation plan to ensure that there are no overlaps or duplications when conducting inspection, also closely cooperated with local departments and agencies (DONREs, Economic Zone/Industrial Park Management Units, Divisions of Environmental Police...).

CONTROL, SUPERVISE HOTSPOTS AND RESPOND TO ENVIRONMENTAL INCIDENTS

From 2018 to present, the prevention and proactive control of environmental pollution hotspots has been a key task for regular and periodic implementation in the South. The Southern Sub-DEPC closely coordinated with the DONREs of the provinces/cities in the process of reviewing and making statistics to determine the list of point sources/area sources. The list is reviewed, updated, and compiled annually. For point sources, priority is given to establishments/projects with environmental records/licenses approved by the MONRE for control and supervision activities.

Accordingly, the DEPC has conducted surveys, worked, collected information and data of more than 215 establishments belonging to the type of production with high risk of polluting the environment (environmental records approved by the MONRE). The DEPC is continuing to complete the update and addition of information to the waste source control database software.

Based on the survey, working results, the DEPC (through the Southern Sub-DEPC) issued 101 notices (from 2020 to 2022) of the working results and requested the units to overcome the shortcomings in the implementation of environmental protection content; 24 written notices of working results to the DONREs, requested coordination in supervising the remedial work of establishments; proposed handling of administrative violations on environmental protection for 2 units. To date, most establishments have fixed the indicated deficiencies and reported the results of the remediation.

In addition, the DEPC has carried out special supervision for establishments and projects with high risk of polluting the environment in the South from 2018 to now, including: Lee and Man Paper Factory; Vinh Tan Power Center, Duyen Hai Power Center, Song Hau Power Center and Toc Tien Centralized Waste Treatment Area. A supervision model with “4-party” coordination has been established (DEPC, local DONREs, local community supervision groups and projects/production establishments with high risk of polluting the environment). Accordingly, the DEPC has shifted from being passive and reactive to being proactive in preventing and responding to arising environmental problems. The DEPC has also supervised project complexes, large-scale industrial production, and business estab-



▲ Conference on environmental pollution control in the Southern provinces was held in Ho Chi Minh City on April 21st, 2023



lishments with high risk of polluting the environment to ensure that they meet the conditions to go into official operation and make important contributions to socio-economic development. Up to now, many big projects, including Lee and Man Company in Hau Giang Province, several thermal power plants... have been strictly controlled on environmental protection to put into official operation. The Department also actively cooperates with the DONREs of the provinces/cities to solve arising problems; assumes the prime responsibility for, and closely coordinates with the provinces/cities in the South in timely settlement of hot environmental cases under the authority of MONRE; periodically at the beginning of each year, the Vietnam Environment Administration (now is the DEPC) sends warning documents to DONREs of the provinces/cities to request production establishments in the area to implement measures to prevent environmental incidents when the South is to enter into the rainy season...; strengthens the organization and implementation of environmental protection activities in inter-provincial river basins in the South; promotes professional exchange activities, coordinates with provinces and cities in improving the management capacity of environmental protection; provides professional support to provincial DONREs in solving major environmental problems that are being faced by local authorities but have not yet found suitable solutions such as protecting intensive and super-intensive shrimp farming in the Mekong Delta provinces including Soc Trang, Ca Mau...

However, the results of handling violations have shown that that some inspected enterprises have not comply with the provisions of the Law on Environmental Protection and the contents of the approved environmental impact assessment (EIA) report. They have not built waste treatment works. The inspection, investigation and supervision of environmental protection activities after the appraisal of the EIA report has been paid attention, but the implementation resources are still lacking, so it has not achieved high efficiency; the implementation of environmental protection of many establishments is still formal, coping, and does not show effectiveness of environmental protection measures proposed by state management agencies.

Since then, it is necessary to have more strict supervision and management, and more severe sanctions to be enough to deter establishments that intentionally violate or violate many times.

Also, the system of legal documents is numerous both in number and in specialized fields, going through many stages and periods, some regulations are still general or lack of sanctions, leading to the capture of legal documents timely as well as thorough and comprehensive understanding of the regulations to be applied in the process of handling work for civil servants in this area facing many difficulties and limitations. The inspection force is not enough in both quantity and quality, not commensurate with the requirements of state management as well as the tasks arising in practice; funding and equipment for inspection and investigation are lacking and have not been allocated regularly according to regulations...

SUGGESTIONS AND RECOMMENDATIONS

Firstly, to publicize conclusions on environmental protection, it is necessary to publicly update the inspection conclusions on the portal of inspection agencies or agencies assigned to perform the specialized inspection function, state management agencies at the same level in accordance with the legislation on inspection.

Secondly, for units that are inactive, delay the payment of administrative violations or fail to report on the results of remedial measures following the inspection conclusions, it is necessary to continue to include them in the inspection list for the compliance of the legislation on environmental protection. At the same time, it is necessary to propose to the competent authorities detailed guidance on the implementation of coercion for establishments that do not comply with the sanctioning decisions as prescribed.

In addition, the development of annual inspection and investigation plan for a number of units under MONRE and DONREs is still slow or the content of the plan is not close to the approved inspection orientation; the rate of unscheduled inspections and investigations is still low compared to requirements; the database system on inspection and complaint letters is incomplete, lacks of updates and the connection to share data between the Central and local authorities is not comprehensive, leading to processing complaint letters duplicate, over-level, out-of-authority, expired, and time consuming. Therefore, it is necessary to strengthen the exchange and sharing of information, to solve problems arising in practice with local authorities; be ready to support local authorities in the process of implementing mechanisms, policies, and legislation and to solve and remove difficulties as well as problems arising in the process of inspection and investigation. Establish information exchange mechanism; develop and share a database on objects of inspection, investigation, complaints, and denunciations between the Department and DONREs.



Thirdly, the DEPC and DONREs will strengthen close coordination to implement the Plan to strengthen prevention, supervision, and control of establishments with risk of polluting the environment, promulgated by Decision No. 750/QĐ-BTNMT dated 28th March 2023 of the Ministry of Natural Resources and Environment (MONRE). In the Southern region, the Plan will priority the following contents: (1) Continue to carry out environmental supervision for large-capacity establishments, operating areas with high risk of polluting the environment, polluting the environment; (2) Strictly control the environment for establishments, centralized production, business and service areas, industrial clusters, craft villages (especially 54 industrial parks and clusters without centralized wastewater treatment system and 47 industrial parks with large wastewater sources); (3) Continue to review, classify and strengthen the prevention, control and supervision of establishments at risk of polluting the environment.

Fourthly, step up coordination in receiving, handling and responding to complaints and petitions of organizations, individuals and communities on environmental protection according to the provisions of Clause 5, Article 159 of the Law on Environmental Protection; especially, further improve coordination in receiving, verifying and processing information of complaints and petitions of organizations and individuals on environmental pollution through the hotline according to the Regulation on receiving and processing information through the hotline on environmental pollution, issued by the Minister of the MONRE in Decision No. 174/QĐ-BTNMT dated 24th January 2022; further promote the role of the people and the community in supervising and protecting the environment; help better supervise the existing environmental hotspots as well as reduce the arising environmental hotspots through supervision of the people and the residential community.

Fifthly, continue to maintain and promote effective control activities for projects with high risk of polluting the environment in the coming time, in which the following activities are promoted:

Strengthen close coordination with local DONREs in the management and control of waste sources (review, statistic and make a list of point sources/area sources in the local area to avoid omitting objects that need to be controlled; operation status of establishments/projects to develop control plans suitable to reality; strengthen thematic control activities by sectors with high risk of polluting the environment such as livestock and poultry raising, aquaculture, seafood processing, steel production... to ensure the initiative in pollution prevention; strengthen control activities and measures for some area sources).

Step up the application and exploitation of information technology in waste source management and supervision through building and upgrading database to quickly exploit waste source information, automatic monitoring data, and provide incident warnings; develop waste source distribution maps and quick interactive software for users to better serve environmental management.

Sixthly, coordinate to solve inter-regional environmental issues, specifically: Continue to exchange and study relevant and practical mechanisms and policies for effective environmental management of large river basins in the South; Step up the implementation of Directive No. 03/CT-TTg dated 18th January 2021 of the Prime Minister on strengthening air pollution control and Decision No. 1973/QĐ-TTg of 23rd November 2021 of the Prime Minister on approval of the National Plan on Air Quality Management for the period 2021 - 2025.

Seventhly, strengthen the efficiency of environmental pollution monitoring and warning; Improve the quality of environmental monitoring and supervision, especially strengthening the mechanism for coordination, data sharing and provision between the central and local authorities; closely coordinate in handling complaints through the hotline receiving complaints and petitions on environmental pollution from Central to local levels.

Eighthly, continue to replicate and draw lessons from the model of environmental protection supervision, waste incident response with the participation of the community, establishment owners and state management agencies (4-party model including: DEPC, DONREs of the provinces/cities directly under the Central Government, local community supervision groups and production establishments) to apply establishments that are at risk of polluting the environment or occur environmental incidents, establishments that are reported by the people and the press about the environmental pollution status ■



Implementation of the National Action Plan on Circular Economy in Viet Nam: From theoretical basis to policy establishment

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The transformation from the linear economy model into the circular economy (CE) model is a major policy of the Communist Party that has been reflected in the 10-year Socio-Economic Development Strategy for the period of 2021 - 2030 and specified in Article 142 of the Law on Environmental Protection 2020 and concretized in the Government's Decree No. 08/NĐ-CP dated 10th January 2022. At the same time, along with the implementation of the provisions of the related legislation, the national master plan, sectoral master plans, provincial master plans for the period of 2021 - 2030, with a vision to 2050, the CE content has also been incorporated in these master plans. From that landscape, the National Action Plan on CE is a policy that needs to be implemented soon.

1. ISSUES FOR THE IMPLEMENTATION OF THE NATIONAL ACTION PLAN ON CE

Currently, the National Action Plan on CE in Viet Nam is in the process of being developed, with first outlines for public consultation of policymakers and experts, local authorities, international organizations, businesses... to get the best available draft of the Action Plan. Thereby, the issues involving the implementation of the National Action Plan on CE (referred to as the Plan) are as follows.

1.1. Objectives and periods of implementation of the National Action Plan on CE

First, the Plan needs to define the objectives to be achieved for each period on the basis of the objectives outlined in master plans (from the national master plan to the current sectoral master plans, the basic timelines determined in the period of 2021 - 2030 with a vision to 2050). Thus, the Plan must also show specific objectives for these two periods. For the period of 2021 - 2030, the Plan should be divided into two time-

lines: the first 5 years of 2021 - 2025 and the next 5 years of 2026 - 2030 to be consistent with the implementation of the National Socio-Economic Development Strategy. For the long-term plan with a vision to 2050, the Action Plan on CE also needs to be considered, assessed and should be divided into two periods of 2031 - 2040 and 2041 - 2050 in line with the National Socio-Economic Development Strategy of these two periods.

1.2. Contents of implementation of the Action Plan on CE

For the implementation of the Action Plan, based on the periods as above, it is necessary to study and develop a plan for each period (short-term, medium-term, and long-term). To do so, it is necessary to carefully study the contents set out in the national, sectoral, and local strategies and master plans to have appropriate contents. On the other hand, at present, the Government has also issued a number of Decisions related to the implementation of CE, such as Decision No. 1658/QĐ-TTg dated 1st October 2021 approving the National Green Growth Strategy for the period of 2021 - 2030, with a vision to 2050; Decision No. 150/QĐ-TTg dated 28th January 2022 approving the Sustainable Agriculture and Rural Development Strategy for the period of 2021 - 2030, with a vision to 2050 and Decision No. 687/QĐ-TTg dated 7th June 2022 approving the Scheme on CE Development in Viet Nam. The guiding contents related to CE in those documents need to be carefully reviewed and studied at the level of implementation, the appropriate issues to be integrated into the Action Plan to avoid duplications, omissions, or contradictions with policy documents already promulgated by the Prime Minister. The implementation of the National Action Plan requires close coordination with line Ministries and agencies, especially the Ministry of Planning and Investment, the Ministry of Industry and Trade and the Ministry of Agriculture and Rural Development because these agencies are closely related to the guiding documents submitted to the Government for the implementation of the CE content in the National Strategy and Master Plan on CE.

1.3. Implementers of the Plan

The Prime Minister promulgates the implementation plan for the National Action Plan on CE, which clearly defines the roles of stakeholders as follows: Ministries and sectors, according to their functions and tasks, will carry out relevant tasks (in terms of leading and coordinating) that complied with their roles. The main task of the Min-

istries and sectors is to implement, review and consult the Government to amend, supplement and complete policies to implement CE in accordance with the transformation from linear economy into CE; to create a favourable mechanism for the practical implementation of CE models; to organize for implementation; to inspect and supervise the implementation of CE models outlined in the Action Plan by sectors and industries; to carry out preliminary and final reviews in each period by sector and industry to timely make additions and adjustments to policies for the implementation of the Action Plan, especially in the first two periods to 2026 and 2030.

For localities, mainly at the provincial level, based on the provincial master plans for the period of 2021 - 2030, with a vision to 2050, it is necessary to implement and integrate the implementation of the CE into the provincial master plans with models for sectors and sub-regions in line with the provincial socio-economic development practices. In particular, there is a link between development with other policies and programs that have been and are being implemented such as new rural development (product of the One Commune One Product Program - OCOP, associated with the CE model). Industrial parks, clusters, and economic zones in provinces need to be transformed into CE industrial parks, clusters, and zones. The provinces and cities that have been implementing the green economy, ecological economy models with supplementation of the criteria for the next transformation into the CE model will have advantages. Localities with traditional craft villages, as well as newly formed craft villages, need to plan the transformation of craft villages into the CE model. Besides, sectors and services with advantages such as waste treatment services, restaurants, hotels, other urban services such as planting trees, dismantling building materials will have many conditions to implement the CE model. Because each locality has its own characteristics, the implementation of the CE model in the locality in accordance with the socio - economic development master plan of the

province/city requires the smart and creative application, flexibility, taking economic efficiency as the basic criteria to implement CE model locally.

In addition, businesses and people are the implementers of CE model, so they need to be fully provided with knowledge and skills to implement. For businesses, to implement CE model, in addition to their knowledge of CE, they need to improve their awareness of policies and legislation related to CE, especially incentive policies when implementing CE model.

On the other hand, the CE model requires implementation from design to production, consumption, the transformation of waste streams to form a closed circle to bring the best economic efficiency for businesses. Therefore, businesses need to actively invest, transform technology in production, train staff to operate and many other related contents. The initiative of the businesses is the most important, especially the role of the business owners, when the business owners are aware of the advantages of implementing CE model then it will be much easier to implement CE model locally. This reality has been proven in several businesses that have successfully transformed into the CE model in our country. Besides businesses, the CE model must also be fully understood by the people, so that they can see the benefits of the CE (such as through waste separation at source, valuable wastes must be reused by the people themselves and treated as a resource). The National Action Plan on CE must put businesses and people at the centre, as they implement the CE model.



▲ Conference "Launching to develop the National Action Plan on CE in Vietnam" in Hanoi on June 28th, 2022



In addition, socio-political, socio-professional organizations play an important role in reviewing policies for implementing the Plan, implementing, and supervising the implementation of CE models. The good promotion of the role of socio-political organizations, especially socio-professional organizations will create more motivation and perfect the CE models in the locality, because the CE model is diverse and abundant, belonging to many different sectors and industries, therefore, the participation of socio-professional organizations will make an important contribution to each sector and industry.

For science and technology (S&T) organizations and experts, the implementation of the CE model requires investment and model innovation, based on S&T as the core. Therefore, the role of S&T organizations and accompanying scientists to implement the CE model is important. Depending on each type of CE model deployed in practice, it requires the participation of different S&T organizations and experts, suitable for each different type of model. S&T organizations and experts are also the bridge to transfer advanced technologies in the world, new technologies suitable for each type of production to implement the CE model during the implementation of the Plan in Viet Nam.

2. SOME RECOMMENDATIONS TO IMPLEMENT THE PLAN

To effectively implement the Plan, some recommendations are proposed as follows:

Firstly, based on the tasks assigned by the Government, the Ministry of Natural Resources and Environment (MONRE) has been developing an Action Program on CE. The MONRE needs to continue to improve and collect opinions from organizations, businesses, line Ministries and agencies in time to submit to the Government before December 2023.

Secondly, for the Plan to be effective and of high quality, it is necessary to have coherence and synchronization with other relevant documents and regulations, avoiding contradictions, duplications, and conflicts with already issued documents.

Thirdly, the National Action Plan on CE must be based on the basic principles and operation of the market, taking market forces to promote the development of CE models; create conditions to encourage economic sectors to participate, especially emphasize the role of the private economic sector in investment and development of CE models for different sectors and industries.

Fourthly, the transformation from the linear economy model into the CE model will bring a fundamental change in awareness, policy, technology, and a transformation of the whole society in production and consumption associated with economy, natural resources, environment, and climate change. Therefore, it is required to have a specific strategy in the short-term, as well as in the long-term, and is clearly reflected in the Action Plan on CE.

Fifthly, many CE models have been successful in the world, especially in developed countries with high science and technology capability, which is a good opportunity for Viet Nam to learn and receive transfer. Along with opportunities, there are great challenges, therefore the implementation of the Plan needs proper selection and priorities in accordance with each period and practical conditions, feasibility when deploying the CE model in Viet Nam for optimum efficiency.

3. CONCLUSION

The National Action Plan on CE is the concretization of the master plan and legislation on encouraging the development of the CE model in Viet Nam. This is a big change in the economic development model in Viet Nam, in line with the general trend of the world, which is the transformation from the linear economy model that consumes significant natural resources and pollutes the environment into the CE model, minimizing resource usage, extending product life cycle and reducing waste to the environment, towards zero emissions in the entire economy. To do so, the National Action Plan on CE needs to be implemented soon and in line with the practical conditions of Viet Nam, promoting the role of stakeholders in the implementation of the CE models ■

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Implementing the Strategy for the Sustainable Exploitation and Use of natural Resources and Protection of the Marine and Island Environment towards 2030, with a vision to 2050

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Following the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment towards 2020, with a vision to 2030, on 3rd April 2023, the Government issued Resolution No. 48/NQ-CP approving the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment towards 2030, with a vision to 2050. The organization for implementation of this Strategy will make an important contribution to strengthening the management of marine environment in Viet Nam today. The Strategy provides overall orientation on long-term and basic goals for management of marine natural resources and environment associated with the mobilization of resources and fundamental solutions according to the development roadmap.

1. RESULTS ACHIEVED IN THE IMPLEMENTATION OF THE STRATEGY FOR THE SUSTAINABLE EXPLOITATION AND USE OF NATURAL RESOURCES AND PROTECTION OF THE MARINE AND ISLAND ENVIRONMENT TOWARDS 2020, WITH A VISION TO 2030

The Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment towards 2020, with a vision to 2030 was approved by the Prime Minister in Decision No. 1570/QĐ-TTg dated 6th September 2013 (hereinafter referred to as Strategy 1570) with the goal of better understanding of the sea, its potential, advantages, and adverse impacts from the sea; promoting exploitation and use of marine natural resources in a sustainable way; preserving the quality of marine water environment; maintaining the ecological functions and biological productivity of marine ecosystems, contributing to the successful implementation of the Vietnam Marine Strategy towards 2020, for the sake of the country's sustainable development. Over the years, the Ministry of Natural Resources and Environment (MONRE), line Ministries, sectors and coastal local governments have organized the implementation of the Strategy and achieved remarkable results in marine environment management as follows:

Regarding survey and assessment of the marine environment: Survey has been conducted and data have been obtained on the current state of the water environment, sedimentary environment, and environmentally vulnerable areas have been identified in 16 key areas from Thanh Hoa to Binh Thuan at a depth of 30 - 60m and in the marine areas of Vietnam from Thua Thien - Hue to Binh Dinh at a depth of 0 - 60m, in areas around 9 islands and island clusters up to 6km from the coastline.

Initially, seafood resources have been preliminarily assessed by layers in Vietnam's seas, the current state of biodiversity in coral reef ecosystems, seagrasses, mangroves forests, alluviums, estuaries, lagoons; several new coral species have been discovered and added to the list, the current state and coverage of coral reefs and mangroves have been assessed. Also, a set of maps at the scale of 1/500,000 - 1/2,000,000 has been developed on the current state of distribution of mangrove ecosystems and coastal lagoons; distribution of seagrasses; distribution of seagrasses for sub-regions; distribution of seagrasses in key survey areas; distribution of sea bottom marine resources at the scale of 1/500.000 - 1/2.000.000.

Regarding monitoring the marine environment, building a marine environment database: Focused on building a system of environmental monitoring stations in coastal localities and periodically conducted water environment monitoring in estuary and coastal areas. Monitoring results at localities are being used for environmental control, aquaculture purposes...



Regarding control of waste sources: Ministries, sectors and localities have actively organized the development and implementation of tasks, actively surveyed and made statistics of sources discharged into the marine environment, conducted the marine environment monitoring, invested in building waste treatment systems in coastal areas and implemented many solutions to control marine environment pollution such as developing technical guidelines on prevention and response to environmental incidents in localities, coastal production and business establishments, regulations on environmental protection for chemicals, pesticides and veterinary drugs; completed the legal provisions related to the control of pollution sources from waste sources on land; reviewed and adjusted national technical regulations on environment in line with domestic conditions and international integration requirements.

Regarding response to incidents at seas: Conducted research, proposed the establishment of particularly sensitive sea areas (PSSAs) in the sea areas of Quang Ninh - Hai Phong and completed the dossier to submit to the International Maritime Organization to propose the establishment of PSSAs in Vietnam. In addition, the method of assessing oil spill pollution at seas has been completed, sensitive areas for oil spills have been identified and initially a method to calculate and quantify losses due to oil spill pollution and environmental pollution has been proposed; oil spills have been promptly and effectively handled and responded to.

Regarding protection of marine ecosystems and biodiversity: Detailed planning has been made for 7 marine protected areas (Bach Long Vi, Phu Quy, Hai Van - Son Cha, Hon Cau - Ca Na, Tien Yen - Ha Coi, Ly Son, Hon Me); 12 marine protected areas have been established and put into operation: Co To, Bai Tu Long (Quang Ninh); Bach Long Vi, Cat Ba (Hai Phong); Con Co (Quang Tri); Cu Lao Cham (Quang Nam); Ly Son (Quang Ngai); Nha Trang Bay (Khanh Hoa); Nui Chua (Ninh Thuan); Hon Cau (Binh Thuan); Con Dao (Ba Ria - Vung Tau); Phu Quoc (Kien Giang); mangrove forests have been actively planted, coastal ecosystems have been protected and restored.

Regarding development of marine science and technology: Some localities have been active and proactive in investing in marine science and technology research; the research contents focused on integrated coastal zone management, building a set of indicators of environmental damage in coastal areas, zoning ecological functions, applying new technologies and models in fishing and aquaculture.

Although the above-mentioned positive results have been achieved, the implementation of Strategy 1570 still has certain limitations and weaknesses. That is the formulation of marine economic development master plans and plans is still limited (the delimita-

tion of administrative boundaries at seas, the marine spatial planning, the master plan on sustainable exploitation and use of resources in the coastal zones have not yet been approved); the transfer and exploitation of baseline survey data on marine resources and environment for socio-economic development activities is still slow; the marine environment is still locally polluted in aquaculture areas, bays where ships anchoring at sea, estuaries... are under pressure of ocean plastic waste; funding for the implementation of the Strategy has not yet been secured; implementation capacity including management and technical aspects at the Central as well as local level is not strong enough, the staff force is thin and does not meet the requirements.

2. MAJOR CONTENTS ON MANAGEMENT OF THE MARINE ENVIRONMENT OF THE STRATEGY FOR THE SUSTAINABLE EXPLOITATION AND USE OF NATURAL RESOURCES AND PROTECTION OF THE MARINE AND ISLAND ENVIRONMENT TOWARDS 2030, WITH A VISION TO 2050

Management of the marine environment in Viet Nam today is in the context of intertwined advantages and disadvantages. It is advantageous to have initially established an integrated management method in the management of marine and island resources and environment; has gradually integrated deeply with the trend of marine environment management of countries in the region and the world; there has been a link between Viet Nam and the world in sharing benefits and objectives of marine environment management, especially efforts to solve common problems of marine and ocean environment; has been taking advantage of advanced management methods, capital, science and technology of the world to serve the management of the marine environment. The difficulty is that the awareness of marine environment management is still low, especially the awareness of state management of the marine environment in an integrated manner; there are gaps and lack of synchronization in the marine environment institutions; marine environment management institutions have certain limitations; resources for marine environment management have not yet met the requirements; global problems of



▲ Conference to announce the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment to 2030 with a vision to 2050

marine environment such as transboundary pollution of marine environment, oil spills and toxic chemicals at seas, ocean plastic waste, invasion of harmful alien organisms, loss of marine and coastal biodiversity as well as risks of marine environmental incidents may occur due to socio-economic development pressures in coastal areas and marine activities.

In this context, on 3rd April 2023, the Government issued Resolution No. 48/NQ-CP approving the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment towards 2030, with a vision to 2050 (hereinafter referred to as Strategy No. 48) with the overall goal as: “Marine and island resources are exploited rationally, used effectively, fairly in service of socio-economic development in association with assurance of national defence and security, foreign affairs and international cooperation; pollution of the marine environment is prevented, controlled and significantly reduced; marine, coastal and island biodiversity is protected, maintained and restored; the values of natural heritage and marine cultural heritage are conserved and promoted; the impact of natural disasters is minimized as much as possible, proactively and effectively respond to climate change and sea level rise, aiming to turn Việt Nam into a strong and affluent maritime country”. One of the specific objectives of marine environment management set forth by Strategy No. 48 is that “the problems of transboundary pollution, marine environmental incidents, and ocean plastic waste pollution are effectively monitored, controlled and managed”.

The objectives of Strategy No. 48 show that marine environment management has been paid attention in a comprehensive way: from prevent, control and minimize marine environment pollution to protect, maintain and restore the marine, coastal and island biodiversity; management of marine and island environment is in association with rational exploitation and efficient use of marine and island resources.

To achieve environment management objectives, Strategy No. 48 has set out the following major orientations and tasks:

Firstly, periodically carry out survey, statistics, classification, monitoring and assessment of pollution types, pollution status and sources to marine environment pollution. Step up the survey and assessment of the load capacity of the environment, determine the level of risks of marine environment pollution for marine economic development; carry out risk zoning and mapping of marine environment pollution risk zoning; announce marine and island areas exceeding the load capacity of the environment.

Secondly, strengthen capacity and proactively control, supervise and deal with regional and global marine environment issues including transboundary pollution, ocean acidification and other related issues. Strengthen capacity of the system of inte-



grated monitoring and supervision of marine and island resources and environment.

Thirdly, prioritize resources from environmental protection funds to implement the National Action Plan for Management of Marine Plastic Litter by 2030. By 2030, the rate of plastic waste collection and treatment at beaches, marine resorts and marine protected areas will reach 100%.

Fourthly, strengthen the organization and develop tools, means and sanctions to enhance the efficiency of coordination, inspection, investigation, and supervision in controlling and dealing with marine and island environment pollution.

Fifthly, protect and maintain the existing system of nature reserves; survey and evaluate proposals to establish new nature reserves on seas, coastal areas and islands; strengthen the conservation of biodiversity outside nature reserves; restore degraded marine and coastal ecosystems. Establish, expand, and strengthen the capacity for management of breeding areas, areas of juvenile aquatic life and migration routes of aquatic species.

Sixthly, step up the survey, assessment and determination of the vulnerability, and endangered nature of endemic marine species with scientific and economic value to come up with options and solutions for protection, conservation, and restoration.

Seventhly, strictly control the exploitation, breeding, and cross-border trade of wild marine species on the list that need to be conserved. Prevent, strictly and effectively control invasive alien species; strictly control the introduction of exotic aquatic species and the introduction of alien species through marine shipping activities.

The Strategy No. 48 also provides overall solutions to achieve the goal. These are solutions for propaganda, raising awareness about the sea, sustainable exploitation and use of marine and island resources and protection of environment; fulfilling and smoothly operating the institution of integrated and unified management of marine and island resources and environment; training, mobilizing and using human resources for marine survey and research, integrated and unified management of marine and island resources and environment; increasing and diversifying

capital sources for basic survey, marine and island resource management and environmental protection; promoting scientific research and application of high technology in basic survey, exploitation and use of marine and island resources and environmental protection; promoting international cooperation in marine and island resource management and environmental protection.

Thus, with the achieved results of the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment in the previous period and the determination of the objectives, orientations, tasks and solutions of the Strategy for the period to 2030, with a vision to 2050, the Strategy plays an important role in managing the marine environment. Currently, the implementation of the Strategy is both the driving force and the goal of marine environment management associated with sustainable exploitation of marine resources. Therefore, it is necessary to have close coordination between Ministries, sectors, and coastal local authorities in organizing the implementation of the Strategy. First, relevant Ministries, sectors and coastal local authorities should soon develop, issue, and organize the implementation of action plans to implement the Strategy with adequate investment in human and financial resources. Only in this way, we can effectively promote strategic tools in marine environment management in our country ■

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Promoting the role of enterprises in implementing the Kunming - Montreal Global Biodiversity Framework and the Vietnam National Biodiversity Strategy

TA THỊ KIỀU ANH

Nature and Biodiversity Conservation Agency, MONRE

In December 2022, at the United Nations Biodiversity Conference (COP15), 196 countries adopted the Kunming - Montreal Global Biodiversity Framework (GBF). Under Goal 15, all large transnational business and financial organizations are required to assess and disclose their risks, impacts, and dependence on nature by 2030 at the latest.

Adopting the GBF is a significant step towards a positive future of nature, but the success of the GBF will be determined by how quickly and effectively governments implement it and its impact on national legislation. This is a unique opportunity for governments, civil society, business and financial organizations, and other relevant stakeholders, to work together to halt and reverse nature loss by 2030.

1. THE ROLE OF ENTERPRISES IN IMPLEMENTING THE KUNMING - MONTREAL FRAMEWORK

Target 15 of the new GBF serves as a wake-up call for the private sector. It conveys a clear message to all large and transnational businesses and financial organizations: it's time to prepare for the assessment and disclosure of risks, dependencies, and impacts on biodiversity. Governments will require you to do so by 2030 at the latest. For the first time in a multi-lateral agreement, governments have explicitly committed businesses to evaluate their reliance on nature in their operations. This sets an ambition that will accelerate the transformation of our socio-economic systems and encourage proactive actions from companies to protect, restore, and sustainably use nature.

Target 15 commits governments to take legal, administrative, or policy measures to “encourage and enable” all businesses and financial organizations to act on nature. It is important that the target distinguishes between large businesses and small and medium enterprises (SMEs), taking a more prescriptive approach for the former.

Accordingly, the target states that governments will “ensure that large and transnational companies and financial organizations” take the actions listed in the target. This means governments are responsible for taking the necessary steps to require large companies and financial organizations to act, and that these actions cannot be limited to voluntary measures.

Meanwhile, Target 15 recognizes the need for a different approach for SMEs, who have less capacity and need additional support and incentives from governments to comply with the objectives of the target. The text clarifies that governments will “encourage and enable” all businesses, to take the necessary actions, without adopting strict requirements for SMEs. Governments could, for example, develop clear and consistent guidance for SMEs, as well as provide tailored tools and science-based technical and financial support.

To implement the GBF, businesses also need to take specific actions:

Compliance with monitoring, evaluation, and disclosure requirements

According to GBF, at the latest by 2030, all 196 parties of the Convention Biological Diversity (CBD) must have adopted requirements that ensure all large businesses and financial organizations are assessing, monitoring, and disclosing their impacts and dependencies on nature.

By explicitly mentioning that governments will need to “ensure” action is taken, including through ‘requirements for all large businesses’, the target sends a clear signal to the business community to expect - and prepare for - mandatory disclosure of biodiversity impacts, dependencies and risks in many jurisdictions by 2030.

Target 15 sends a clear signal to the business community to prepare for mandatory disclosure of impacts, dependencies, and risks in many countries around the world by 2030. Through disclosure, large businesses and financial organizations will have to address double materiality by demonstrating the implications of nature loss on their financial value as well as their impacts on nature.

They will have to disclose their:

Nature-related risks - this will incentivize nature-positive action and provide crucial insights to investors as they seek to align their investments with a nature-positive economy.



▲ *Businesses in responding to the International Day for Biological Diversity:
From commitment to action*

Impacts on nature - this is equally important as it provides useful and relevant information to external stakeholders such as policymakers, investors, and consumers. This disclosure will create a baseline for business action and ensure companies are held accountable.

Dependencies on nature - this will help build a complete picture of the crucial importance of nature to business and create a sense of urgency in reversing its decline. Dependencies highlight the financial, strategic, and operational risks linked to biodiversity loss and its impacts on business performance, helping to build the business case for the protection and regeneration of nature.

As a result, businesses and financial organizations can expect nature-related assessment and disclosure to become standard practice, as is already the case for climate-related disclosure.

Providing sustainable information to consumers

Target 15 also commits governments to encourage and enable companies to provide information to consumers so they can make more sustainable consumption choices. As per the disclosure element of the target, large companies and financial institutions can expect stricter requirements to fulfill this objective than SMEs. This component of Target 15 is closely related to Target 16 of the Global Biodiversity Framework, which

details how governments will increase consumer awareness and support sustainable consumption. The type of information to be provided by businesses and how this will be done will be decided at the national level.

Report on compliance with regulations on access to genetic resources and benefit sharing (ABS)

The third component of Target 15 places the governments to ensure businesses report on their compliance with access to genetic resources and benefit-sharing regulations, when applicable. This would apply to compliance with national ABS regulations, as well as potentially other relevant obligations arising from the new benefit-sharing mechanisms to be developed on Digital Sequence Information (DSI).

2. THE NATIONAL STRATEGY ON BIODIVERSITY AND THE ROLE OF ENTERPRISES IN BIODIVERSITY CONSERVATION

On January 28th, 2022, the Prime Minister of Vietnam approved the National Strategy on Biodiversity to 2030, with a vision to 2050 (Decision No. 149/QĐ-TTg). This is the commitment of the Government of Vietnam to biodiversity conservation in the next decade and at the same time meets the requirements of the GBF. However, in Decision No. 149/QĐ-TTg, it is not clear and specific about the role of enterprises. The financial solution in the implementation of the strategy is the only content that shows the specific role of enterprises: “Encouraging and mobilizing the participation of the community, enterprises to invest financially for biodiversity conservation; implementing public-private partnership models in conservation and sustainable use of ecosystem services and biodiversity”. The role of enterprises in implementing

Vietnam's National Biodiversity Strategy is more encouraging and voluntary when compared to GBF. However, the mandatory participation of enterprises in biodiversity conservation is partly reflected in the relevant legal provisions which are analyzed in the following contents.

According to the Law on Environmental Protection (2020), the responsibility of enterprises for biodiversity is closely linked to the process of environmental impact assessment. Accordingly, investment projects with the risk of causing adverse impacts on the environment need to carry out an environmental impact assessment and the environmental impact assessment report must include the following contents on biodiversity: Description of "natural and biodiversity conditions"; Assessment of "impact on biodiversity"; Proposing "the plan for compensation for biodiversity (if any)". For the process of consulting the environmental impact assessment report, the Law also stipulates that the community, individuals, and relevant organizations must be consulted. Thus, similar to the requirements of the GBF, businesses with related investment projects must also assess the impact on biodiversity, and must inform stakeholders about the impact on biodiversity.

The Forestry Law (2017) stipulates that: Sustainable forest management and sustainable forest certification are tools prescribed by the State to ensure that organizations (including businesses), individuals, and households can operate effectively on forest lands that are allocated or leased by the State, implement forest management methods to ensure the achievement of forest protection and development goals, without reducing forest values and enhancing values, and improving livelihoods, environmental protection, contributing to maintaining national defense and security. According to the provisions of the Forestry Law (2017), forest owners who are organizations (including enterprises) must develop and implement a sustainable forest management plan. Accordingly, the contents of the plan for sustainable forest management for production forests should include contents on biodiversity such as assessment of natural, and socio-economic conditions; status of forest resources and biodiversity; sustainable forest management objectives (total protected forest area, achievement of forest cover, biodiversity conservation, protection of endangered, precious and rare species of forest plants and animals); developing plans for forest protection and forest ecosystem protection; biodiversity conservation, forest plant and animal species protection.

At point b, Clause 2, Article 60 of the Law on Biodiversity (2008), it is stated that: Organizations and individuals licensed to access genetic resources have the obligation: "To report in writing to the national competent authority who grant access permits to genetic resources on the results of research, development, and commercial production of products within the time limit specified in the license to access genetic resources". Therefore, although the National Biodiversity Strategy does not

specify businesses' obligations, the current regulations partly reflect the GBF's requirements for businesses related to biodiversity conservation and sustainable use. However, current regulations only refer to enterprises with projects that have a risk of adverse impacts on the environment, forest production enterprises, and enterprises with licenses to access genetic resources and benefits sharing. Meanwhile, there are many enterprises operating in the fields of production, cultivation, eco-tourism..., which use natural resources and also need to take responsible actions for biodiversity conservation.

3. RECOMMENDATIONS

In order to strengthen the role of enterprises in implementing biodiversity conservation in general and implementing the national biodiversity strategy in particular, the State needs to supplement regulations that require large and multinational enterprises doing business in the fields related to biodiversity (use of natural resources, ecotourism...) to have an assessment of the value of biodiversity on their activities, simultaneously assess the impact of their activities on biodiversity and publish relevant information; Supplementing mechanisms and policies to support, encourage and create conditions for small and medium-sized enterprises to participate in the above-mentioned processes; Raising awareness of the general public towards a sustainable consumer society, minimizing the impact on environment and biodiversity.

For businesses, active participation in the conservation of nature and biodiversity can be done by: Finding the right tools to assess their impact and dependence on nature and biodiversity such as the World Economic Forum's Measuring Nature-positive Outcomes from Business Actions; Committed to contributing to the implementation of relevant goals in the National Biodiversity Strategy by setting transparent, time-bound, specific, scientific goals to make a positive contribution to nature; Change through best practice across the value chain is gradually creating change effects across the system, as many of the key impacts and dependencies of companies are located in the value chain, so they can accelerate participation in the implementation of the National Biodiversity Strategy and and GBF through product traceability, transparency, and enhanced data collection mechanisms; Publicize information on achievements related to nature and biodiversity ■



Experience in implementing extended producer responsibility (EPR) to promote circular economy development in Korea



▲ Mr. Lee Jae Kwon
Chief Representative of KEITI in Vietnam

• Could you please tell me, how is EPR regulated in the Korean legal system over the years?

Mr. Lee Jae Kwon: In Clause 1, Article 16 of Korea's Law on Resource Saving and Promotion of Recycling, it is stated that "through the improvement of raw materials, structure and collection system at the production stage, the circulation stage can be promoting the recovery and recycling; or among products and packaging with a large amount of waste generated after use, waste production, import, recovery, recycling...". This is a regulation in the list of products in the Presidential Ordinance. Also in Clause 3 of this Law, manufacturers who are obliged to recycle must pay the recycling division to the Mutual Association.

The combination of the above clauses shows that the Korean EPR stipulates that the manufacturer of the product or the manufacturer that uses the packaging is obliged to recycle a certain amount of waste generated by the product or packaging and carry out recycling and processing; in case of not being directly recycled, the manufacturer must make financial contributions and expenses to carry out the recycling.

The EPR Regulation in Korea was revised and supplemented from the deposit regulation that was implemented in 1992 and took effect on January 1st, 2003, with a focus on the recycling system.

• Could you please tell me some specific regulations on principles, conditions, documents and procedures for financial support for recycling and waste treatment activities in Korea?

Mr. Lee Jae Kwon: Every year, the Korean Ministry of Environment amends the regulations on job handling, Government subsidies and financial support. The regulation is based on the main Laws in the field of waste management such as "Law on Waste Management", "Law on

Extended Producer Responsibility (EPR) is a necessary, important factor in promoting and sustaining the circular economy. This concept is expected to be an important solution to effectively solve the current plastic waste problem.

EPR is applied in many countries around the world to control waste discharged into the environment. In other words, EPR shows that the responsibility of the manufacturer does not stop at the product, but extends to post-consumer waste management. Manufacturers are responsible for recalling, sorting,

Recycle bottles, boxes, jars, bags, and packaging after the product inside has been used up. Post-consumer waste management belongs to the place where the waste is generated, rather than the Government's job as before. To understand the above regulations in Korea, Environment Magazine interviewed Mr. Lee Jae Kwon - Chief Representative of KEITI in Vietnam.

Resource Cycle Basis" and Law on Subsidies such as "Law on Management of Subsidies", "Regulations on general management of Government subsidies", specifying the ratio of support between the Government budget and the local budget for each waste treatment facility such as waste incinerators, biogas synthesis facilities from organic waste, ordinary public sorting facilities, landfilling facilities, building environmentally friendly energy zones, general waste treatment facilities in agricultural and fishery areas...

This Regulation applies not only to projects implemented from the budget of local governments, but also to projects directly invested and operated by the private sector. In 2023, the Regulation is revised, expanding the recipients of government subsidies to be pre-treatment facilities to reduce the landfill rate to zero and facilities for sorting recyclable domestic waste at construction sites. construction with less than 5 tons of waste generated to promote recycling of household waste, the regulation demonstrates the Korean government's constant efforts to promote resource recycling.

With the EPR mechanism, there will be a recycling share payable to the waste recycling community. This is about 200 billion won per year through the Korea Resource Circulation Assistance Agency and support for recycling units based on the volume of recycling.

• ***What are the advantages and disadvantages of implementing this content in Korea?***

Mr. Lee Jae Kwon: Korea differs from European countries and Japan in enforcing the previous regulation of collecting waste fees by volume, through the consumer recycling responsibility regime. Accordingly, the consumer's recycling responsibility regime, building a system to easily classify recyclable wastes. To further improve this regime, EPR has been applied to improve recycling capacity from sorting to recycling. When implementing EPR in combination with the recycling responsibility of consumers previously implemented not only helps manufacturers avoid having to pay double costs for waste collection and treatment, creating a balance in terms of waste collection and disposal. In addition, the EPR Regulation also creates employment and economic efficiency (savings in landfill costs, incineration costs).

However, that Regulation has not only positive sides. If EPR regulations are not implemented thoroughly, it will make the growth of the recycling market less stable, becoming a cause affecting investment decisions and narrowing the technology development of entities in the recycling industry. In addition, the list of EPR implementations such as paper packaging, synthetic plastics, household appliances, fluorescent products... also has a large difference in the results of recycling, so it is also a limitation that increases the efficiency of recycling. instability in the recycling market. It can be concluded that, in order to promote recycling growth in each category, the most important thing is still the Government's support for technology development and appropriate policy formulation.

• ***How is the mechanism of organization, operation, and monitoring of EPR implementation to promote efficiency, the right audience and the set purpose, sir?***

Mr. Lee Jae Kwon: To operate the EPR regulation, it is necessary to divide the roles of consumers, local authorities, manufacturers, Mutual Associations, Ministries/sectors, and Government agencies. First, consumers have to do the sorting of recycled products before throwing them away, local authorities have a form of punishment for violators, and monitor people to comply with the regulations. Producers who are obligated to recycle are obliged to recover and reuse recycled products under Article 16 of the Law on Resource Saving and Promotion of Recycling. In addition, the reciprocal associations for each material recycling project also need to strictly manage the distribution of money for recycling in order to realize the common recycling community according to the obligation based on the above Law.

At the same time, there should be Government agencies (Korea Environment Agency) in charge of administration related to regulatory compliance such as receiving reports on recycling collection obligations, recycling results. For each manufacturer, the Korean Ministry of Environment is in charge of the entire EPR process such as the development and amendment of the Law, the announcement of the recycling list, the establishment of the Mutual Association...

The EPR regime is conducted in the following order: (1) Announce the rate of reuse obligation of each product (Korea's Ministry of Environment announced in December of the previous year); (2) Submit and approve the plan of collection and recycling obligations (January - February of the same year, manufacturer Korea Environment Agency); (3) Enforcement of recycling obligations (From January to December of the same year, the manufacturer); (4) Submit report on quantity and results of products subject to recycling obligation (Done in April of the following year); (5) Notice of recycling fee (implemented in July next year, Mutual Association); (6) Pay the recycling fee (To be done in August next year). The manufacturer has a recycling obligation, the Mutual Association and the Korea Environment Agency coordinate and monitor each other according to the above process.

• ***In order to promote a circular economy, what experience would you share from Korea so that Vietnam can refer to it in the near future?***

Mr. Lee Jae Kwon: Circular economy is the concept to change "linear economy" which is using a lot of resources and creating waste. To create a circular economy that does not waste resources and continues to reuse is not just about recycling once or twice. Therefore, it is necessary to continuously reuse recycled materials over and over again. In order to do so, the recycled material must be of good quality and must maintain stable quality. Therefore, consumers, manufacturers, recovery and recycling businesses, and the Government must all work together to promote the circular economy. I would like to emphasize that the circular economy should not only operate as an "economic principle".

The industrial model is gradually changing in response to climate change occurring around the world. The use of recycled materials has also become the norm in the industry. The European Union (EU) has developed a plan by 2030, the mandatory use rate of renewable materials is 30%. It also means that if Korean businesses want to export products to EU countries, they must also use 30% of recycled materials. In the future, the use of recycled materials is not an option but becomes a reality. Like it or not, a steady supply of good quality renewable raw materials will become the competitiveness of the industry and become the determining factor of the circular economy. Vietnam is not an exception to this trend, so to promote the circular economy, it is necessary to change the policy and industrial environment.

• ***Thank you very much!***

PHẠM ĐÌNH



Circular economy businesses are extremely attractive to investors

A recently published report (10th May) has shown that 2022 was the most active year yet for investments in the circular economy (CE) - an increase of 16 percent. Businesses classified as specifically operating CE models saw an investment of £850 million in disclosed capital across 142 businesses by private investors - up from £788 million across 122 businesses in 2021.

The increase outperformed the whole UK Mergers and Acquisitions (M&A) market where the volume of investments fell by 12 percent. The report, created by BDO LLP Financial Services Company, also shows that venture capital accounted for 62 percent of the transactions last year, supported by mid-market private equity at 17 percent.

Commenting on the findings Mr. Rory McPherson, corporate finance partner at BDO, said: "The transition away from linear business models creates value while working towards sustainability goals. As ESG continues to move up the agenda, CE businesses are extremely attractive to investors and BDO is ideally placed to advise the ambitious entrepreneurs and pioneering (private equity) backed businesses in the sector".

WHICH CE SECTORS ARE SEEING THE MOST INVESTMENT?

The report found that industrials and manufacturing remain the most prominent sector for investment into the CE, accounting for 36 percent of deal volumes in 2022. This was made up by disclosed investments totalling £180 million at an average of £6.7 million per transaction. Material recovery from waste remains a crucial focus for the sector, with innovative methods being developed by entrepreneurs to extract products or generate energy from waste. In 2022, 35 percent of investments in this area were dedicated to initiatives centred around material recovery.

Incorporating circularity into products, processes, and business models has been a focus for 27 percent of investments, with 22 percent directed towards the use of sustainable circular materials. Both these areas are vital in the industrial and manufacturing sectors' transition towards circularity. The built environment, which represents 40 percent of deals in these categories, uses near-

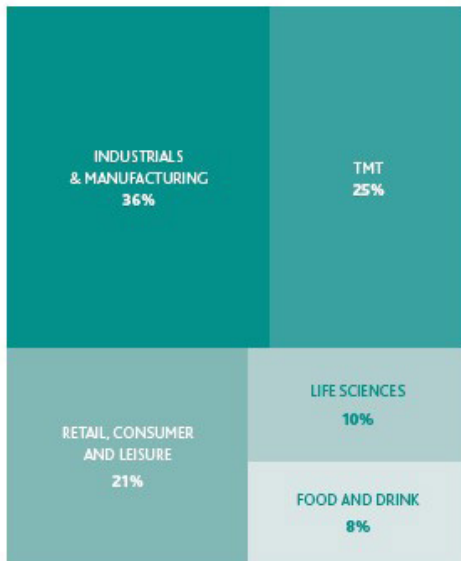
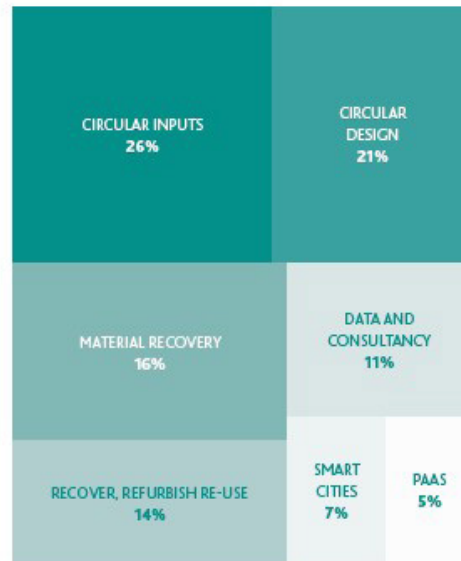
ly half of the globally extracted materials each year, making it a significant contributor to greenhouse gas emissions. Investors have concentrated on businesses that can reduce this carbon impact and substitute legacy virgin materials with sustainable ones. This approach could potentially reduce CO₂ emissions from building materials by 38 percent by 2050.

Technology, media and telecommunication (TMT) are the second most prominent area for investors in the CE, accounting for 25 percent of deal volumes in 2022 - with disclosed capital of 173 million at an increase of £67 million since 2021. This is closely followed by the retail, consumer and leisure market at 21 percent and £212 million in disclosed capital - a rise of 46 million since 2021.

WHAT IS DRIVING THE INVESTMENT TRENDS IN THE CE?

Thematically, investments focusing on businesses using or developing circular and sustainable inputs received the most investment last year at 26 percent. The report states that societal desires to consume more sustainable products have led to significant investment in brands using circular, sustainable input materials across all sectors. In the industrial and manufacturing sectors, this can be seen in the prominence of investment into material recovery within the sector at 35 percent.



DEAL VOLUMES BY SECTOR
2022DEAL VOLUMES BY CIRCULAR ECONOMY THEME
2022

▲ Deal volumes by sector and theme 2023

The trend is also evident in retail, consumer and leisure where 40 percent of the investments have gone into more circular inputs. This is followed by recovery, refurbishment or reuse (RRR) at 27 percent of investments. The report states that this is driven by the rise in interest in second-hand fashion as consumers are placing increasing importance on businesses facilitating the RRR of products to extend the useful life of assets and slow industry consumption.

According to investors questioned by the report's authors, environmental, social and governance (ESG) considerations are now essential in potential investments due to their role in both protecting and creating value. With growing demand from stakeholders, such as regulators requiring increased disclosure and consumers supporting businesses that reflect their ethical values, ESG credentials have become a significant factor in assessing consumer-facing businesses. The concept of ESG itself has broadened, now encompassing more than just energy and climate, but also biodiversity and natural resources. The increasing focus on circularity principles in business models aims to reduce costs and enhance efficiency.

According to those questioned, investment decision-making now places ESG at its core, responding to the shift in consumer preferences towards more ethical and sustainable products and heightened regulatory scrutiny. A positive narrative built on this is seen as central to any business's value creation plan. Businesses that drive significant positive environmental and societal change are more likely to yield higher investor returns over typical investment horizons of three to five years.

EXAMPLE INVESTMENTS

Precision Micro and A-Gas Serve as notable examples of businesses investing in the CE. Precision Micro invested £5 million to reconfigure its processes and introduce specialist machinery, which led to a 51 percent reduction in waste ferric chloride production. In 2021, they managed to recycle 97.4 percent of materials, even re-using certain materials in their processes when possible.

A-Gas placed emphasis on Lifecycle Refrigerant Management (LRM) to create a sustainable future for its industry. Through their recovery and reprocessing efforts, they managed to avoid 7.5 million tons of carbon emissions in 2021. In 2022, investments in the CE brought about advancements in various industries, with companies like Pura and Turnkey also cited as examples. Pura, a progressive baby care brand, is making strides in environmental sustainability. It specializes in creating environmentally friendly baby wipes and nappies, a significant move considering that 90 percent of baby wipes in the UK contain plastic. Turnkey, a technology platform, has focused on providing real-time reporting and detailed insights into company ESG performance.

RECOGNIZING THE POTENTIAL OF CIRCULAR STARTUPS

The Ellen MacArthur Foundation recently launched its Circular Startup Index to help connect businesses and investors with startups featuring one or more principles of the circular economy. The Index currently contains over 500 companies across the world, with calls from the Foundation for more startups to apply. Commenting at the time of its launch, Mrs. Ella Hedley, Project Manager, Startups, at the Ellen MacArthur Foundation, said: "Designing a circular future requires radical innovation to rethink how our economy works. Thousands of circular startups are already in the case. But they need more support and investment. So, we created the Circular Startup Index to create visibility of the breadth of circular startups on the market and help businesses discover suitable circular solutions" ■

AN VI (Source: Resource)



Redesign the business models to end plastic pollution

Following the decision by all 193 UN Member States at the United Nations Environment Assembly in March 2022 to end plastic pollution, the UN Environment Programme (UNEP) has released a report examining the economic and business models needed to address the impacts of the plastics economy.

The report states that while negotiations are now underway on a binding legal framework to come into effect in 2024, the economic, fiscal and business models needed to address the associated impacts of plastic pollution, while also safeguarding livelihoods of those involved in plastic manufacturing, are still unclear.

According to the United Nations Industrial Development Organization, global plastic production and use has grown exponentially since the 1950s, with around nine million people employed globally in polymer production and plastic processing industries. Currently, the world produces 430 million metric tons of plastics each year, of which over two - thirds are short - lived products which soon become waste, a growing amount after one single use - 139 million metric tons in 2021, according to the Minderoo Foundation. Plastic production is set to triple by 2060 if "business-as-usual" continues.

Research also shows that under a business-as-usual scenario, plastic could emit 19 percent of global greenhouse gas (GHG) emissions allowed under a 1.5°C scenario by 2040, essentially making the goal out of reach.

"Turning off the Tap: How the world can end plastic pollution and create a circular economy" proposes a systems change to address the causes of plastic pollution, combining the reduction of problematic and unnecessary plastic use with a market transformation towards circularity in plastics. The report says this can be achieved by accelerating three key shifts - reuse, recycle, and reorient and diversify - and actions to deal with the legacy of plastic pollution.

SHIFT ONE: REUSE

Studies show that reuse systems provide the highest opportunity to reduce plastic pollution (a reduction of 30 percent by 2040) by replacing some of the most problematic and unnecessary products. Unnecessary plastics are those with low or no utility (over - packaging) that can be eliminated while providing the same utility, those designed for a short use period when reuse or new delivery models could provide the same utility, and those that can be substituted for alternative materials with a more sustainable footprint (as validated by Life Cycle Assessment studies).

The report calls for an acceleration towards the market for reusable products and to transform the throw-away economy to a reuse society by enabling the reuse market to have a stronger business case than the single - use plastics market.

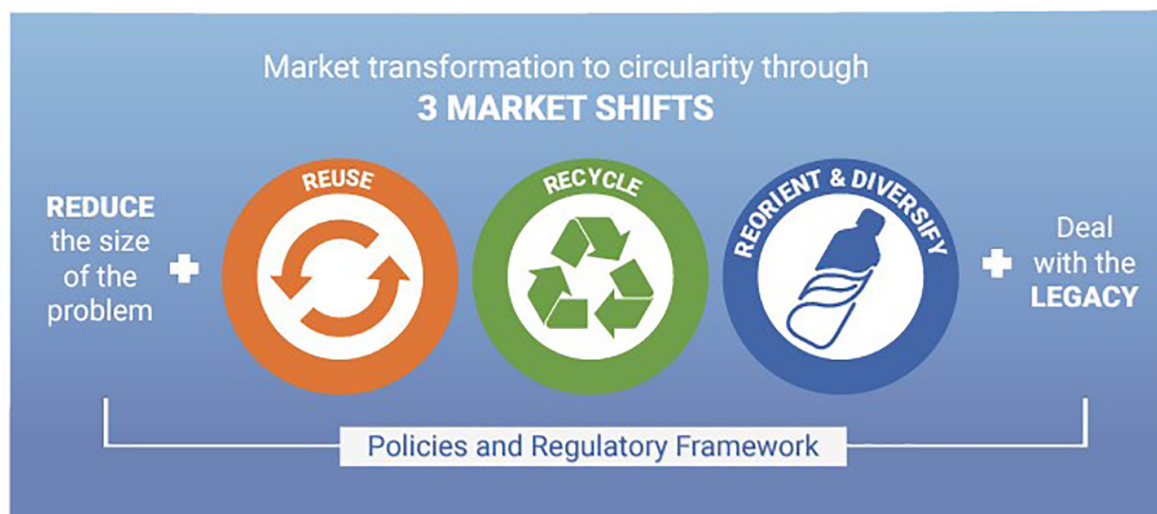


Reuse schemes (also referred to as reuse systems or models), refer broadly to new delivery models in which a single product (a package) achieves multiple trips, rotations or uses for the same purpose for which it was originally used. This can range from simple bulk dispensers in-store to more complex schemes with deposits and packaging take-back, washing and repair. It includes the shift to reusable water bottles, food containers and bags, new delivery models such as refill from dispensers and bulk systems in retail, low - packaging subscription services, concentrated product capsules, and take - back services with reverse vending machines, deposit refund schemes and washing pooling systems.

SHIFT TWO: RECYCLE

In 2020, a study by the Pew Charitable Trusts and SYSTEMIQ showed that accelerating the market for plastics recycling by ensuring recycling becomes a more stable and profitable venture could reduce the amount of plastic pollution by an additional 20 percent by 2040. The report calls for an adequate availability of feedstock that can be recycled and to ensure that recycled materials can compete on a level playing field with virgin materials.

Recycling can be accelerated by improving its economics, aligning the incentives in design with the recycling economy and ensuring safe and fair recycling in practice and at scale (enabling investment in infrastructure). As with reuse, the presence of specific chemicals of concern in plastics reduces their potential for circularity, and thus makes recycling less economically favorable.



▲ *The systems change towards a new circular plastics economy*

SHIFT THREE: REORIENT AND DIVERSIFY

Sustainable alternatives could reduce pollution by 17 percent by 2040 but struggle to compete in markets with products made of virgin fossil fuel-based polymers owing to several challenges: cost of product, consumer demand and lack of appropriate regulations.

UNEP suggests shaping the market for plastic alternatives - such as paper and compostable materials - to enable sustainable substitutions, thus avoiding replacing plastic products with alternatives that displace rather than reduce impacts.

For example, substituting with more sustainable alternative materials has higher production costs on average (one and a half to two times the cost of plastics), but in some cases substitutes can improve sustainability (sustainably sourced, recyclable paper). A virgin plastic tax would contribute to improving the economics of alternative materials by increasing the price of plastic products made from virgin plastics.

The report notes that the substitutions need to be made in an environmentally and socially sound manner, considering unintended consequences of substitutes or prioritizing substitutes that are themselves recycled materials: recycled (secondary) plastic can also be used as a suitable substitute material.

A NEW PLASTICS ECONOMY

The report acknowledges that even with the market transformation approach, a significant volume of plastics cannot be made circular in the next 10 to 20 years and will require disposal solutions to prevent pollution, new ways of financing the collection and disposal of legacy plastics and preventing microplastics from entering the economy and the environment.

UNEP says that a transformed plastics economy will introduce new economic benefits by bringing new business opportunities particularly for those who adapt faster.

If a new plastics economy was implemented, the report says that by 2040 it could: (1) Create opportunities for jobs, income and innovation: 700,000 additional jobs; improved livelihoods for millions of workers in informal settings; close to USD 1.3 trillion (10.3 percent) savings in direct public and private costs between 2021 and 2040; (2) Reduce damage to human health and the environment by reducing exposure through an 80 percent reduction of plastic pollution; 0.5 Gt CO_{2-eq} GHG emissions prevented annually; avoiding USD 3.3 trillion of environmental and social costs between 2021 and 2040 (32.5 percent cost savings); (3) Reduce liabilities, risks and litigation associated with damage from plastics pollution; (4) When the direct, environmental and social cost savings are added up, more than USD 4.5 trillion are saved, or 20.3 percent reduction in costs overall.

Due to the cross-border flows of plastic, liabilities and risks, a new plastics economy would require harmonized international action. The report recognizes however that countries will start from different places to implement market transformations and the specific policy mix appropriate to a particular country will need to consider the trade-offs built into policy choices and options. If the amount of materials that are reused or recycled in the economy increases to 27 percent, the outflow of mismanaged plastic waste ending in the environment decreases by over 80 percent. The report states that "turning off the tap" of plastic pollution is "within reach" ■

HÔNG NHUNG (Source: UNEP)



The Treaty for the conservation and sustainable use of marine biological diversity

After more than a decade of talks, the 193 United Nations (UN) member states have reached a landmark international agreement for a new Treaty for the conservation and sustainable use of marine biological diversity in areas of the ocean outside national jurisdiction, known as the “high seas”.

In New York on 17th June 2023, President of the UN Intergovernmental Conference on Marine Biological Diversity of Areas Beyond National Jurisdiction Rena Lee announced that the substantive issues of the Treaty had been agreed upon.

“Following a two week long rollercoaster ride of negotiations and super-hero efforts in the last 48 hours, governments reached agreement on key issues that will advance protection and better management of marine biodiversity in the High Seas”, said Director of the High Seas Alliance Rebecca Hubbard in a press release from the High Seas Alliance.

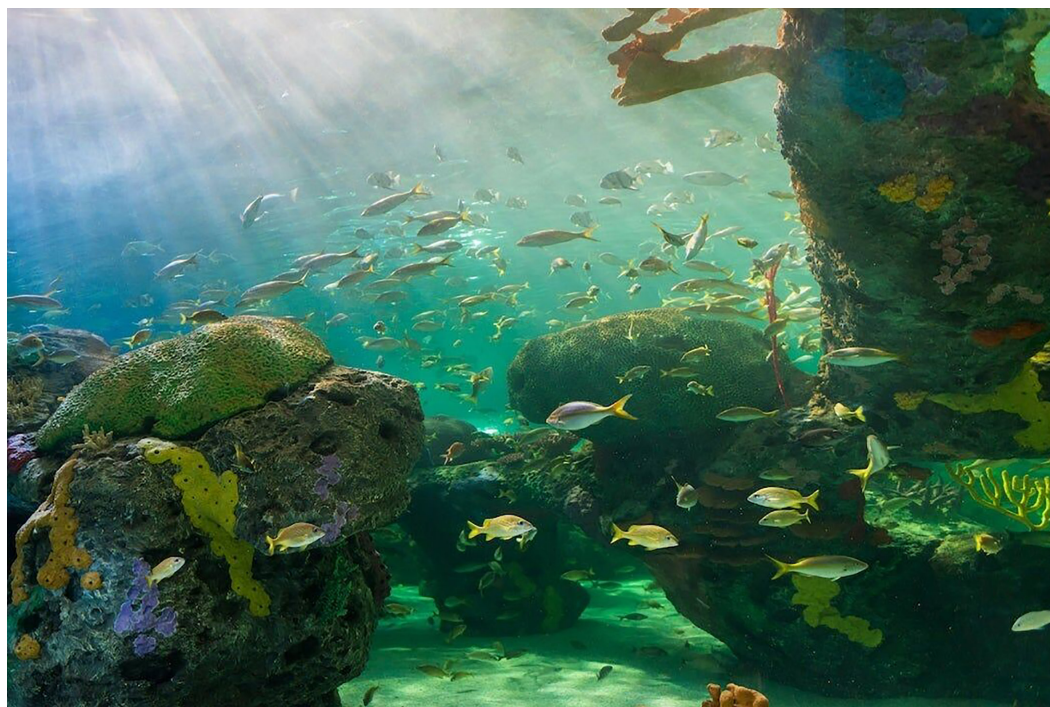
The Treaty will clear the way for the establishment of marine protected areas (MPAs) in the high seas and provide guidelines for assessing how human activities impact the environment, a press release from the Pew Charitable Trusts said.

“High seas marine protected areas can play a critical role in the impacts of climate change”, said Mrs. Liz Karan, Project Director of the Pew Charitable Trusts’ Protecting Ocean Life on the High Seas, in the Pew Charitable Trusts press release. “Governments and civil society must now ensure the agreement is adopted and rapidly enters into force and is effectively implemented to safeguard high seas biodiversity”, she added.

The high seas are home to abundant marine life and extraordinary ecosystems like deep-water corals. They also serve as migratory routes for sharks, whales and other species. A network of MPAs in the high seas is crucial for preserving a minimum of 30 percent of marine and terrestrial habitat worldwide by 2030 - an international movement known as “30 by 30”. 30 by 30 was adopted last December by the Parties to the UN Convention on Biological Diversity as part of the Kunming-Montreal Global Biodiversity Framework.

“Following the Kunming - Montreal Agreement, which sets out a global path for biodiversity protection, this treaty will bring a similar ambition to the high seas. Because Canada’s waters are bounded by three international ocean basins, it has an outsized role in ensuring that the Treaty is fully implemented, once formally adopted”, said Vice President of Conservation and Projects at Oceans North Susanna Fuller, in the High Seas Alliance press release.

Currently, only a little more than one percent of the high seas is protected, but the new Treaty will provide a framework for establishing MPAs, as well as the legal basis for attainment of the 30 by 30 goal. Protecting at least 30



▲ The high seas are home to abundant marine life and extraordinary ecosystems like coral reefs



percent of the planet's ocean by 2030 is the minimum level needed to ensure it will be healthy, scientists have said.

The Treaty will make it easier to manage shipping, fishing and other activities that have historically contributed to the deterioration of ocean health in the high seas. The high seas are home to millions of species and is the largest habitat on the planet.

"It's been a very long journey to get to a Treaty. We will be looking to the 52 states that make up the High Ambition Coalition to lead the charge to adopt, ratify and identify important High Seas areas to protect", said Mrs. Rebecca Hubbard in the High Seas Alliance press release.

One of the major sticking points in Treaty negotiations was how best for nations to share marine genetic resources (MGR) and the profits that will eventually come from them, reported The Guardian. MGR are the genetic material of deep-sea organisms like krill, seaweeds, corals, marine sponges and bacteria, which can potentially be used in cosmetics and medications.

"The High Seas Treaty opens the path for humankind to finally provide protection to marine life across our one ocean. Its adoption closes essential gaps in international law and offers a framework for governments to work together to protect global ocean health, climate resilience and the socio-economic wellbeing and food security of billions of people", said Director of the International Union for Conservation of Nature's Global Marine and Polar Program Minna Epps.

The new Treaty will be opened for signatures on Sept. 20, during the annual meeting of world leaders at the General Assembly, and it will take effect once it is ratified by 60 countries. The Treaty will create a new body to manage conservation of ocean life and establish marine protected areas in the high seas. It also establishes ground rules for conducting environmental impact assessments for commercial activities in the oceans. Secretary-General Antonio Guterres told delegates that the adoption of the treaty comes at a critical time, with the oceans under threat on many fronts ■

PHƯƠNG TÂM

(Source: The Guardian)

In mid-2022, a toxic algal bloom began to quickly spread through the Oder River, which in part straddles the border between Germany and Poland. The algae, *Prymnesium parvum*, normally lives in the brackish waters near coastlines. But fed by salty run-off from industrial sites, and made more concentrated by low water levels, it enveloped huge stretches of one of Europe's longest waterways.

THE RESULT WAS CATASTROPHIC

During a six-week stretch from July to September, the algae is suspected to have killed 360 tonnes of fish. Such a massive die-off in the heart of Europe sparked handwringing and caused officials to ban bathing and fishing for many of the 16 million people who live in the Oder basin. A recent European Union report found the crisis could have been averted with better monitoring of the Oder's water. The event, say experts, is a prime example of why countries need to more closely track the health of their rivers, lakes and aquifers, which are facing mounting pressure from not only pollution but also climate change and biodiversity loss.

"By closely monitoring changes in our water bodies, we can better predict cascading risks and tipping points that lead to disasters," says Head of the United Nations Environment Program's (UNEP's) Marine and Freshwater Branch Leticia Carvalho. "That will help us more sustainably use our precious water resources and head off catastrophes that could affect tens of millions of people". Mrs. Leticia Carvalho's comments came just ahead of the World Water Week Conference in Stockholm, where delegates are expected to discuss how innovation can help countries safeguard water supplies for communities and the increasingly fragile biodiversity that relies on healthy blue ecosystems.

Most of the disasters that afflict humanity are in some way tied to water. Along with severe cases of pollution, those crises include floods, landslides, storms, droughts and wildfires. Shifts in the Earth's hydrological cycle linked to climate change are increasing the frequency and intensity of many of those events, says a UN-convened panel of climate scientists. Since 2000, the number of flood-related disasters has more than doubled and the duration of droughts has jumped almost 30 percent.

In the next 30 years, the number of people at risk from water-related disasters could rise to 1.6 billion from 1.2 billion, according to a 2019 report by the Organization for Economic Cooperation and Development. Experts say that monitoring the state of freshwater bodies brings



As water-related disasters mount, experts push for early warning systems

with it a host of benefits. Along with heading off disasters, like the one in the Oder River, it can help states do everything from track pandemics to better cool nuclear plants. While in recent years, many countries have stepped up efforts to monitor pollution, water levels and a host of other water-related data, huge gaps still remain in both developed and developing countries. This often leaves policymakers without the information they need to make crucial decisions about freshwater resources that support hundreds of millions of people.

For instance, significant information gaps exist on emerging pollutants in water supplies, including so-called “forever chemicals”. This group of human-made substances, found in everything from household cleaning agents to non-stick cookware and which can endure for several thousand years, are linked to cancer, reproductive harm and immune system damage, even at low levels. In many places, there is also a lack of information about the prevalence of potentially dangerous microorganisms and chemicals in pharmaceuticals that can cause health problems in humans. Data derived from satellite imagery, artificial intelligence (AI) and more conventional sources can help countries head off water-related disasters. There is evidence that just 24-hour advance notice for storms and heatwaves, which have been linked to changes in the water cycle, makes a 30 percent difference in loss of life and damage.

Cyclone, typhoon and hurricane early warnings regularly save countless lives. Google, a UNEP partner, recently expanded its AI-enabled flood forecasting platform, Flood Hub, to 60 countries. Data can identify which areas are prone to flooding and droughts and help local and national governments plan for climate adaptation and disaster risk reduction. In the face of climate breakdown all over the world, more countries are investing in multi-hazard early warning systems as a way to adapt to extreme weather. To support these efforts, the United Nations Secretary-General launched a push in 2022 to ensure all people on the planet are covered by early warning systems by 2027. That’s considered especially important in the world’s least-developed countries, less than half of which have access to these systems.

AVERTING POTENTIAL CRISES

Early warnings are a cost-effective way of building resilience at local and national levels, and avoiding severe economic setbacks. In Panama, drought has been threatening to close the Panama Canal, as the lake water needed to operate locks that allow shipping to pass through the canal is becoming depleted. Water data aids planning that can help prevent an economic catastrophe. Data covering water flow, levels and quality gathered by countries and global institutions, such as the World Meteorological Organization, help public authorities manage and protect ecosystems more effectively, as they allow for target-setting, detailed planning and law enforcement. New technology can be an asset: machine learning can help identify likely untreated sewage spills and help water companies identify malfunctioning treatment plants.

Water data can also identify emerging crises in unexpected areas. For example, data on the state of river basins is key to predicting impacts on energy systems. According to the World Meteorological Organization, in 2020, 87 percent of global electricity generated from thermal, nuclear and hydroelectric systems directly depended on water availability. About a quarter of existing and projected hydropower dams are within river basins that have a medium to very high risk of water scarcity.

Water temperature information is also important. Nuclear power stations in France had to reduce output last year when river water got too warm for cooling purposes. Monitoring can also help countries reduce plastic pollution in rivers, which in many places has reached crisis levels. A warning system developed by the UNEP-DHI Centre surveys all major river systems in the world, helping researchers identify pollution hotspots (the data can be accessed through the Global Partnership on Plastic Pollution and Marine Litter (GPML) Data Hub).

Wastewater sampling can also help identify the emergence of diseases. Since microorganisms often pass from humans into water systems, scientists have long used wastewater to track polio. In recent years it was used to detect possible waves of COVID-19. “In the past few years, there has been an explosion of climate and nature-related disasters, but there has also been a data explosion”, says Mrs. Leticia Carvalho. The challenge now is effective water data analysis for policymakers in all countries to help people plan for, adapt to, and mitigate threats to terrestrial and marine ecosystems and promote sustainable development ■

NAM HÙNG

(Source: Unep.org)

12 steps for governments to build climate and economic resilience

Action on climate change has never been more urgent. With current levels of global warming, scientists warn that some catastrophic climate system "tipping points" are already dangerously close to being triggered. Governments and society must act fast to reduce emissions and adapt to already "baked in" climate impacts. Yet countries remain far off track in implementing climate policies at the necessary scale and speed.

Climate action does not happen in a vacuum, isolated from the world's other equally-urgent policy priorities. Climate policies need to go beyond the sole aim to reduce emissions, and must also aim to be cost-effective, fair and equitable, politically tenable, compatible with health, social and fiscal policy and aligned with foreign policy concerns. Above all, they need to be resilient in the face of future disruptions.

FACING THE UNKNOWN: CLIMATE POLICIES MUST CONSIDER FUTURE DISRUPTIONS

Events over the past few years have hammered this point home. The COVID-19 pandemic and Russia's war of aggression against Ukraine have demonstrated the climate-related opportunities a crisis can bring, such as immense economic recovery spending and capacity for dramatic societal transformations within short time periods as witnessed during COVID lockdowns and through energy-saving behaviour during the recent energy crisis. They also bring climate-related challenges to light - misaligned recovery spending, locked-in fossil fuel use, and the disruptive effects of geopolitical tensions. The immense scale and speed of the transformation necessary to reach net zero will have profound implications on public revenues, economic structures and labour markets. If left unaddressed, these aspects could undermine and even derail climate policy ambition. In addition, potential future disruptions, such as the rapidly increasing use and capabilities of artificial intelligence, must be considered in the development of climate policies.

NET ZERO+, AN OECD CROSS-CUTTING INITIATIVE

The Organization for Economic Cooperation and Development (OECD)'s flagship initiative "Building Climate and Economic Resilience: Net Zero+" outlines a series of recommendations for a resilient transition to net-zero emissions while building resilience to the impacts of climate change itself. The initiative collates climate-relevant findings from across the OECD's multidisciplinary expertise - for

example on environment, economic and tax policy, financial and fiscal affairs, development, science and technology, and employment and social affairs - to provide cohesive recommendations for making the transition to net zero emissions resilient, and as well as building resilience to the impacts of climate change.

NET ZERO+: CLIMATE-RELEVANT POLICY EXPERTISE FROM ACROSS THE OECD

12 steps for better climate policies

Drawing on a wide range of policy expertise across the OECD, in its first phase, the Net Zero+ initiative collated insights to develop 12 concrete steps for governments to build climate and economic resilience:

1. *Given the increasing threat of reaching climate system tipping points, do everything possible to limit global warming to 1.5°C with no overshoot. Faster reductions are essential and the shape of the pathway matters.* The most up-to-date evidence shows that we are already entering the warming range at which some potentially catastrophic impacts become possible. Every fraction of a degree of warming makes a difference.

2. *Ensure that crisis relief and economic stimulus spending are aligned with climate goals and sufficiently targeted.* The massive amounts spent on crisis relief and economic recovery over the past few years were an opportunity to accelerate climate action, but more could have been done. We must do better to seize the climate-related opportunities that may come with future disruptions.

3. *"Future-proof" net-zero climate strategies to the extent possible, using strategic foresight and anticipating transition bottlenecks.* Some obstacles are already clear - such as the cost of capital, critical materials supply, and re- and up-skilling needed for the transition. Foresight processes can tease out other bottlenecks and possible future disruptions, and develop forward-looking strategies to deal with them.



4. *Focus policy making on a systems level rather than individual components or outcomes.* Systemic resilience implies anticipating future shocks, building in buffers to absorb initial impacts, and ensuring that resources are available to invest in recovery efforts. Some changes may be irreversible and require permanent adaptation to new circumstances.

5. *Get climate policy basics right, tailoring a mix of price-based and other instruments to regional, national and local circumstances, and greening of public governance.* Resilient climate policies must be effective and appropriate to their context. There are no silver bullets here: Governments have a wide range of climate policy tools at their disposal and should make use of all of them.

6. *Mainstream climate change adaptation throughout national policy processes. Exploit synergies between mitigation and adaptation policy objectives while minimising trade-offs.* It's time to get serious about mainstreaming adaptation into core policy thinking. Governments are already facing escalating costs from climate damages and climate impacts will continue to mount even if the most ambitious emissions reductions are achieved. Climate mitigation and adaptation actions should be leveraged in ways that simultaneously support both sets of policy objectives, for example through nature-based solutions.

7. *Address the public finance implications of the net-zero transition through careful fiscal planning, assessing direct and indirect effects of policies, and climate-aligned tax instruments.* Existing taxes on fossil fuels generate significant Government revenues. Reaching net zero means these and others will be lost as economic structures shift. The OECD's modelling of the public finance implications of the net-zero transition shows widely heterogeneous effects across countries and time periods. Careful fiscal planning is essential.

8. *Accelerate innovation through a mission-oriented, outcome-based approach. Target support measures for early-stage innovation and research and development.* Innovation is essential to bring down the costs of emissions reductions and to reach hard-to-abate sectors. Current policy portfolios put too much focus on deployment and not enough on research and development.

9. *Carefully assess direct and indirect distributional impacts of climate policy. Communicate clear, accurate and easily accessible information to the public about how policies work.* Managing the economic effects of climate policies on people is essential. As one example of how to do so, revenue

from carbon pricing can be recycled to balance distributional impacts. To ensure that the net-zero transition is publicly supported, governments must clearly communicate not only why policies are needed, but how they will be implemented and what impacts they may have on households.

10. *Ensure reasonable labour market flexibility and mobility while promoting job quality and protecting workers. Identify skills needs and bottlenecks and prioritise up- or re-skilling.* The net-zero transition will cause some jobs to be lost, but new jobs will emerge. Helping workers shift between sectors, and ensuring they have the skills needed, is integral to an effective, fair and equitable transition.

11. *Better align financial system policies with climate mitigation and adaptation goals, including improved market practices, alignment of core investment policies, use of responsible business conduct tools, and harnessing the double role of the insurance sector as investor and insurance provider.* Reaching net zero will require vast amounts of investment. There will be numerous economic opportunities, but financial markets and the private sector cannot rely on public spending to unlock these.

12. *Recognise the interlinkages between climate and development transitions, drawing on all levers of development co-operation to converge on a 'global approach' that aligns development and climate objectives.* We need to reach net zero globally. Developing countries are both the source of the majority of future emissions and most exposed to future impacts of climate change. Their needs and perspectives must be given equal consideration.

Each of these recommendations is expanded upon in the Project's Phase I synthesis report, *Net Zero+: Climate and Economic Resilience in a Changing World*. This is not a pick-and-mix list, however. All of these steps are indispensable. Recent global crises, and those to come, are an opportunity for governments to prioritise building climate and economic resilience - one that should not be missed ■

HƯƠNG ĐỒ (Source: OECD)



Exploring the ecosystem services and potential futures of coral reefs

Tropical and temperate coral reefs connect natural and human systems in a way that supports long-term human development and well-being and marine biodiversity. The enormous abundance and diversity of life found on these shallow reefs provide ecosystem services upon which several billions of people depend. However, many of these services are at severe risk due to historic and ongoing overexploitation and the threats posed by climate change, which will further degrade habitats and deplete biodiversity.

Over the past four years, the Reef Futures Project has explored the delivery of five ecosystem services - biomass production, nutrient cycling, carbon cycling, cultural value and nutrition value - from coral reef systems, under different climate scenarios, to more effectively plan for the future and design and implement climate-smart management policies. This international collaboration of marine experts from 18 leading research institutions has developed coupled social-ecological models to identify potential win-win scenarios where biodiversity and shallow reefs ecosystem services are secured under future conditions. As the Reef Futures collaboration comes to a close, we present some of the key research findings from the Project:

BIOMASS

Considering dynamic ecological processes to boost provision of fish biomass on coral reefs. Traditionally, scientists have often made use of measures of standing biomass - the mass of all fish in a reef - to identify areas that warrant additional protection or more effective management for sustainable fisheries. However, this only provides information on how much fish are present at any point in time. Through Reef Futures, two more informative metrics have been developed: biomass production, which measures how much biomass a fish community can gain over a period of time, and biomass turnover, the ability of a coral reef to generate new fish biomass. Together, these metrics give a more informative measure of the reef's resilience, productivity and regenerative capacity, which can support setting future climate-smart quotas and developing conservation and restoration management plans which account for changing conditions.

Mr. Raphael Seguin, a student from the University of Montpellier (France), and Mr. Nicolas Loiseau, his supervisor from the French National Centre for Scientific Research (CNRS), with the support of Reef Futures colleagues, carried out data analyses which estimate fish biomass production and turnover on more than 1,900 coral reefs worldwide. In the light of their project findings, published in *Nature Sustainability*, the team

proposes three new classifications of coral reefs and then models these categories according to human and environmental factors. This information helps researchers, practitioners and stakeholders understand how standing biomass and biomass turnover shape the state of reefs worldwide, which reefs are at risk, and how to better protect them.

CARBON CYCLING

Fish provide an important component of the carbon cycle through the excretion of carbonates in their waste. To better understand the importance of this role and how carbonate excretion may change in the future, a team of Reef Futures scientists led by Mattia Ghilardi from the Leibniz Centre for Tropical Marine Research (Germany) determined which characteristics of fish and their environment determine carbonate excretion rates and their mineral composition. Their results show that the amount of carbonates excreted by a fish depends strongly on its body mass and the length of its intestine. Fish from the same family produce carbonates of similar mineral composition, but this also depends on the temperature of the reef and the length of their intestine. These findings allowed the researchers to more reliably calculate the amount of carbonates produced by fish communities on different reefs, in different regions, and globally. This information is useful to predict the impact of anthropogenic factors (mainly fishing and warming) on the contribution of fish to the marine carbon cycle. For instance, the results suggest that selective fishing pressure of larger fish and high trophic levels could cause disproportionately large reductions in carbonate excretion or shifts in the mineral composition of excreted carbonates.

NUTRIENT CYCLING

As with the carbon cycle, reef fish are also vital in the recycling of other nutrients through the excretion of metabolic waste and faeces, while also temporarily storing nutrients in their bodies as they grow. A team led by CNRS and the Practical School of Advanced Studies (France) assessed how



nutrient recycling and nutrient storage by fish varies across the world's tropical reefs and tried to identify the socio-environmental drivers of these differences. They used measures related to diet, metabolism and growth to run a bioenergetics model able to predict nutrient fluxes for 1,100 species from the most common families of reef fish. Their findings show that all components of nutrient cycling by fish are highly variable across reefs. Nutrient cycling is at least five times higher than nutrient storage on most reefs, emphasising the role of fish as a source, rather than a sink, of nutrients.

CULTURAL VALUE AND TOURISM

What's the relationship between people's perception of beauty and an animal's conservation needs? A wide consortium of researchers led by Nicolas Mouquet from CNRS led a study published in Plos Biology to find out. The team asked 13,000 people to rate the aesthetic attractiveness of photographs of various reef fishes in an online survey. They used this data, in combination with an artificial intelligence model they developed, to provide, for the first time, the aesthetic value of 2,417 of the most encountered reef fish species worldwide. They found that bright, colorful fish species with rounder bodies tended to be rated as most beautiful. Their findings also show that less beautiful fishes are the most ecologically and evolutionary distinct species and those recognised as threatened. Unattractive species were also of greater commercial interest. This study thus highlights the profound mismatch between aesthetic value and importance of conservation action for reef fish.

NUTRITIONAL VALUE

Despite fish being an essential source of micronutrients for over a billion people in mainly low-income countries, access to local fish resources for many of these dependent populations is reduced through exports, either after catch or through catch by foreign fishing vessels. In many cases lower-quality fish and fish products are then imported to meet local demand. A preliminary study conducted by Mrs. Christina Hicks of Lancaster University (UK) highlighted the need for fisheries and food policies focused on improving nutrition, rather than increasing volumes of food produced, or revenue generated from exports. They developed a finfish nutrient composition database, used to predict the availability of nutrients from the world's fisheries. The results provide nutrient composition information for more than 5,000 fresh and marine fish species and is freely and globally available. Scientists, policy makers, managers, and academics can use it to identify which of their local fish are the most nutritious and need protection. The initiative saw the nutritional data added to FishBase - an online encyclopaedia of fish with crucial information on more than 34,000 freshwater and marine species, available in 14 languages.

HOW CLIMATE CHANGE AND OVERFISHING JEOPARDISE MARINE FISHERIES

An international team of scientists sought to understand how overfishing and climate change, the two principal threats to marine fish stocks globally, influence the capacity for fisheries to support the food security of individual nations. The study was published in Current Biology and led by Dr. Eva Maire from the Lancaster Environment Centre of Lancaster University (UK). Their findings reveal that climate change is the most pervasive threat in many tropical coastal countries to the supply of essential micronutrients from marine fish catches. Fisheries micronutrient supplies in these countries were found to be less vulnerable to overfishing. The study also suggests that opportunities exist to move towards nutrient-sensitive fisheries management. Countries may be able to adapt their fisheries to switch from vulnerable species to alternative micronutrient-rich species that are resilient to climate change and overfishing, and which are currently under-represented within catches.

The Reef Futures Project was very ambitious with more than 18 partners combining their data and efforts. We particularly wish to thank the young researchers who maintained their motivation at high level and who cemented the consortium. Most of major project outputs were carried out under their remarkable leadership. We are also very proud to see that we reached our objective to provide new estimates for five services provided by fish on shallow coastal reefs, most of them being published or under revision in top scientific journals highlighting the novelty and importance of our results.

We also developed new modelling techniques to improve our ability to make future projections of scenarios mixing both environmental and socioeconomic factors. Last but not least, we clearly show the importance to better manage or even fully protect coastal reefs in future, to meet both social and ecological benefits - findings which clearly resonate with new global commitments to increase protection for marine ecosystems up to 30 percent coverage by 2030, as agreed at last year's COP15 biodiversity conference ■

VŨ HỒNG

(Source: Unep-wcmc.org)



Scaling up green chemistry globally for a sustainable future

Uganda's textile and apparel industry is a major exporter to the world and a main source of income for more than 250,000 households and 5,000 workers in the country. But the textile sector has been reliant on flame retardants that contain highly problematic persistent organic pollutants (POPs) - "forever chemicals" that don't break down easily and can be harmful to human and ecosystem health.

In Jordan, the building sector is growing rapidly to meet the demands of its increasing population growth at the same time as climate change has pushed temperatures to new highs in the region. This has resulted in a need for the country to produce more fire-resistant insulation. The insulation, however, contains halogenated flame retardants and other POPs.

The Yale-UNIDO collaboration is working to address the burdens of historically harmful chemicals and industrial practices from the Global North, which have a disproportionate impact in emerging nations, and bringing the benefits of green chemistry to the places in the Global South that have suffered the worst effects of unsustainable chemistry practices.

These two countries are part of a new initiative led by the Center for Green Chemistry and Green Engineering at Yale (CGCGE) and the United Nations Industrial Development Organization (UNIDO) that will help reduce the use of hazardous chemicals worldwide. With a US\$ 12.6 million grant from the Global Environment Facility, the Global Greenchem Innovation and Network Programme (GGINP) will establish accelerator programs in emerging nations to reduce POPs and greenhouse gas emissions and develop a single global network that will connect stakeholders seeking to implement green chemistry and green engineering alternatives. "If the benefits of green chemistry are going to be realized by everyone in the world, green chemistry needs to be practiced by everyone. And this is exactly what this initiative is trying to achieve," says Program Director of the GGIPN Karolina Mellor. "We are starting with six focus countries who are seeking to transition to cleaner manufacturing and industrial practices and the intent is to scale up".

As countries across the globe invest in their economies and ramp up their industry and manufacturing base, they can avoid the harmful chemicals that have left legacies of pollutants from past manufacturing practices - and current ones - with the help of this new project, the Yale Entrepreneurial Society (YSE) team notes. "The Yale-UNIDO collaboration is working to address the burdens of historically harmful chemicals and industrial practices from the Global North, which have a disproportionate impact in emerging nations, and bringing the benefits of green chemistry to the places in the Global South that have suffered the worst

effects of unsustainable chemistry practices", says Mrs. Hannah Feldman, Program Coordinator for the initiative. "We can take concrete steps to prevent these unsustainable processes from becoming further ingrained and almost irreversible".

Along with Uganda and Jordan, other participating countries are Peru, Serbia, Ukraine, and Indonesia. While each country will focus on a specific industry, their aim is the same: Eliminating POPs, mercury and microplastics, and reducing greenhouse gas emissions.

THE GLUE

The field of green chemistry emerged in 1991, when YSE's Paul Anastas, Teresa and H. John Heinz III Professor in the Practice of Chemistry for the Environment, coined the term "green chemistry" and launched the first research program with this clear definition: "the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances".

Professor Paul Anastas is known as the father of green chemistry and directs the CGCGE. Noting his motivation to alert the world to safer alternatives, he has said in previous interviews: "Looking back over two centuries of chemistry, there has always been this creative tradition of coming up with new ways of doing things that transform the quality of life. Green chemistry is building on that. It says that we can do better. It says that not only can we achieve all of that function and performance, but we can do it in a way that's fundamentally sustainable, nontoxic, and renewable rather than degrading".

Professor Paul Anastas, Director of the CGCGE, leads a session for participants in the GGIPN at the UNIDO Conference in Vienna, Austria, on March 13th, 2023. Professor Paul Anastas, who is considered the father of green chemistry, discusses how to achieve greener industry and create a global community that promotes sustainability. While the field has continued to grow and nations across the world have developed regulations to cut down on hazardous chemicals, connecting chemists, academics, policymakers, and industry leaders across the globe is not easy. Add to that the



more than 350,000 chemicals and mixtures registered for production across the world, and the transition to green chemicals can seem daunting.

“The problem is that all of these networks are very disjointed”, Mrs. Karolina Mellor says. “We envision a platform connecting everybody working in green chemistry that also embraces those who don’t have the resources or avenues to share and learn. This new network will be the glue that binds the field together”, she says. Partners in the Project include the American Chemical Society, ACS Green Chemistry Institute, Beyond Benign, and the National Cleaner Production Centers.

DUPLICATION AND EXPANSION

Stakeholders in the partnering countries say it is not a lack of desire to change to safer chemicals and processes, it is often a lack of awareness of safer alternatives, lack of access to green chemicals, and fear of financial risks. “One issue will be to make clear to the industries that participating in a green transition will give them a steppingstone to new markets”, says Mr. Almoayied Assayed, Director of the Royal Scientific Society’s Water, Environment and Climate Change Centre in Jordan.

The new accelerator program will select and fund pilot projects and startups in each of the six participating countries that will address worldwide goals for reducing and eliminating POPs, mercury, microplastics, and greenhouse gas emissions in the manufacturing and production process. Key to the projects that get funded is their ability to be replicated across the world. “Major companies are coming under new legislation where they must consider sustainability. Green chemistry is stepping in to bring its ideas to the chemistry community as a whole so it can be adapted everywhere”, says Mr. Lars Ratjen, CGCGE Associate research scientist and Program Manager for the UNIDO-YSE Collaboration.



▲ The greening of the textile industry in Uganda will have ripple effects throughout the country

In Jordan, which needs to construct 50,000 new housing units per year, the accelerator program will help the building sector not only provide healthier insulation options, but also access new markets and promote new green policies and regulations.

“We are an economic hub and have an effect on our region. We can exchange our experiences with our neighboring countries, and our companies will be able to expand regionally and internationally”, Mr. Almoayied Assayed says.

Uganda was one of 152 countries to ratify the Stockholm Convention that entered into force in 2004. The country’s leaders also signed the Kyoto Protocol, the Paris Agreement, and the U.N. Framework Convention on Climate Change. But Uganda’s transition to safer and sustainable manufacturing in the textile industry has been slow because of myriad obstacles that keep it reliant on the use of POPs, including perfluoroalkyl and polyfluoroalkyl substances (PFAS).

“One of the challenges is balance. How do we move toward greening the sector while remaining competitive? It’s very expensive for local producers and investors to transition to new technology when there is limited access to financing. Additionally, the textile factories are very old and there may not be awareness of the risks and restrictions of POPs. There is limited access to alternatives, and the legal framework is not in place to facilitate promotion of green chemistry”, says Director of the Uganda Cleaner Production Centre Silver Ssebagala.

Mr. Silver Ssebagala says the accelerator program will spur new buy-in from textile companies to transition to safer alternatives by providing startup funding that will allow companies to enter new markets and grow. The greening of the textile industry will have ripple effects throughout the country, Mr. Silver Ssebagala says. The growth of the textile industry will enhance Government revenue and help eliminate poverty in Uganda while also reducing pollution and minimizing health and environmental hazards.

“We need to move together toward green growth. We need to assist entrepreneurs and investors who want to change from these polluting chemicals”, Mr. Silver Ssebagala says. “Once the process happens in a green factory, there will be opportunities for all the factories in the sector and in the region. There will be a business model that can be duplicated” ■

BÙI HẰNG

(Source: Yale University)



Rights to access information in the establishment and implementation of land use planning and plans in Viet Nam

ĐÀM THỊ MAI OANH

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Nowadays in Vietnam, the right to access information is recognized in Article 25 of the 2013 Constitution, Law on Access to Information 2016. However, in practice, the implementation of this right has not been ensured in certain areas, including the field of land. The right to access land information is a right that land users need to have to satisfy their legitimate needs and to exercise other basic rights of land users as recognized by Law [4]. The lack of transparency in land information leads to an increase in corruption opportunities, reducing the efficiency of resource utilization, and causing citizens and businesses to incur higher costs and efforts in seeking information. Therefore, understanding the legal regulations regarding the right to access land information, as well as the practical situation, is necessary to propose solutions for improving policies that ensure the effective exercise of the right to access land information in general and access to information in the formulation and implementation of land use planning and plans in particular.

1. REGULATIONS ON THE RIGHT TO ACCESS INFORMATION IN THE FORMULATION AND IMPLEMENTATION OF LAND USE PLANNING AND PLANS

In the current conditions, as Vietnam's economy continues to deeply integrate with the world, the demand for land use and the real estate market is becoming more and more vibrant. Therefore, the establishment of planning and land use plans to create functional zones which attract investment, production, and business is extremely necessary. However, in the process of making and implementing land use schemes, the decisions of competent state agencies can significantly affect the lives of people residing within areas covered by land use plans, which may be designated for various purposes to carry out projects. For this reason, citizens have the right to be informed, access, and grasp information related to the formulation and implementation of land use planning.

According to the provisions of Article 28 of the 2013 Land Law, the State is required to undertake the following tasks to ensure the responsibility for building and providing land information: (1) Build and manage a land information system and ensure the access rights of organizations and individuals to the land information system; (2) Timely publish and publicly disclose information within the land information system to organizations and individuals, except for information classified as confidential under legal regulations; (3) Notify administrative decisions

and administrative actions in the field of land management to organizations and individuals whose legal rights and interests are affected; (4) State agencies and authorized individuals responsible for land management and use are obligated to create favorable opportunities and provide land information for organizations and individuals in accordance with legal regulations.

Thus, compared with the 2003 Land Law, the 2013 Land Law has a separate provision to regulate the responsibilities of competent state agencies in providing land information to organizations and individuals. This, on the one hand, shows a change in the current state management mindset, replacing the “ask-give” mechanism with recognition of the State's responsibilities and obligations towards citizens in this matter. On the other hand, the legalization of this regulation also demonstrates the importance of transparency and openness in information, contributing to the implementation of democracy and fairness in the process of land management, use, and distribution in Vietnam. From the general principle provisions in Article 28, the citizens' right to access information in the process of making and implementing land planning and land use plans is detailed in each period.



Firstly, during the phase of land planning and land use plans.

Clause 6, Article 35 of the 2013 Land Law stipulates that land planning and land use plans must be based on the principles of democracy and publicity. This principle is further elaborated in Article 43 regarding the process of gathering opinions on planning and land use plans. Thus, it affirms that the people's right to access information is expressed very clearly, and right from the outset of the land planning and land use planning process.

During this period, the Government and the People's Committees of provinces and districts are responsible for organizing the collection of public comments on land planning and land use plans at each level. The ways for people to capture information and give their feedback are diverse and depend on the characteristics of each level.

For national and provincial-level land planning and land use plans, the process will be conducted by publicizing information about the contents of the land planning and land use plans on the website of the Ministry of Natural Resources and Environment (MONRE), along with the Provincial People's Committee. Meanwhile, the collection of people's opinions on district-level land planning and land use plans is carried out through organizing conferences, directly obtaining opinions, and publicly disclosing information on the official website of the Provincial and District-level People's Committees.

Through these transparency measures, citizens can access official, accurate, and transparent information in the process of land planning and land use plans. As a result, they can know about the location and area of land for projects and developments, and then proactively arrange their future living, working, and production activities.

However, regarding the individuals for collecting opinions according to the current regulations. This aspect remains somewhat unsatisfactory. The reason for this is that, in addition to the directly affected households in the project's designed area, some other citizens living nearby may experience varying degrees of influence due to changes in technical and social infrastructure, environment... Therefore, these individuals should also know some necessary and basic information to proactively manage their labor, daily life, production, and business activities.

Furthermore, the Law also explicitly designates the primary responsibility for publicizing this plan to the organization in charge of compensation and site clearance, as well as the Commune-level People's Committee where the land use planning project is located also have the responsibility to collaborate to complete this part of the work.

Secondly, during the phase of the land use planning implementation.

This is one of the important stages for the State and investors to engage in activities to develop and carry out projects in accordance with land use plans. It is also a period that has a great and direct influence on the lives of people whose land falls in the project planning area.

Article 48 of the 2013 Land Law stipulates the public announcement of land planning and land use plans. Accordingly, land planning and land use plans at the national, provincial, and district levels must be publicly announced after being decided and approved by competent state agencies. The MONRE is responsible for publicly announcing national-level land planning and land use plans at its headquarters and on its official website; Provincial-level People's Committees are responsible for publicizing provincial-level land planning and land use plans at their headquarters and on their official website; The District-level People's Committees are responsible for publicly announcing the district-level land planning and land use plans at their headquarters and on their official website, and also for publicizing the content of the land planning and land use plans related to communes, wards, and townships at the headquarters of the Commune-level People's Committee. The public announcement shall be announced within 30 days from the date of approval of a competent state agency's decision. The publicity is carried out during the period of land use planning. Through the above regulations, publicizing land planning and land use plans is a mandatory procedure that serves as a prerequisite for subsequent stages. In addition, publicizing land planning and land use plans also plays an important role in both material and spirit aspects for residents whose land is located in the project implementation planning area. This helps them to be more proactive in arranging all aspects of daily life, work, and production.

Thus, it can be observed that during this period, citizens can access official information on land use planning and plans through both direct and indirect ways instead of just relying on posting notices as per previous regulations. This is a new and progressive point of the 2013 Land Law, highlighting its commitment to transparency, openness and democratization in the process of state land management.



2. CURRENT SITUATION AND EXISTING ISSUES IN THE IMPLEMENTATION OF THE RIGHT TO ACCESS INFORMATION IN THE FIELD OF LAND PLANNING USE

2.1. The current situation of exercising the right to access information about land through documents published on electronic information portals

According to a study on “Evaluation of Publicizing District-Level Land Planning, Provincial-Level Land Price Lists on Electronic Platforms in 2022”, conducted as part of the “Empirical Study Aimed at Enhancing Citizens’ Access to Land Information” initiative by the United Nations Development Program (UNDP) in Vietnam, the assessment process extended until February 2023, through the review of the official portals across all 63 provinces, cities, and 705 districts and towns throughout the country. The transparency level of land information by provincial and district authorities was assessed based on five criteria: (1) Information Transparency; (2) Ability to search information; (3) Timeliness of information; (4) Completeness of information (for district-level land planning and use plans); (5) Information usability (readability, comprehensibility, and compatibility with common software) [3].

In this study, the results of reviewing electronic information portals revealed that out of 705 district-level units, 345 had published the Land Use Plan for the period 2021-2030 on their electronic platforms; 389 had published the Land Use Plan for the year 2022; 337 out of 704 district-level units had publicly disclosed

Table 1: Publication of information on land use planning and plan

No.	Information	Public quantity	Publicity rate	Publication on time		
				Yes	No	Unknown
1	District-level land use planning for the period 2021-2030	345	48,9%	105/345	116/345	124/345
2	District-level land use plan in 2022	389	55,2%	149/389	127/389	113/389

(Update until March 14, 2022*)

* To ensure continuity and comparability with the results of the first-year research, the publication of documents related to the searched land information is only up to March 14th, 2023.

the Land Use Plan for the year 2021 on the electronic information portal of the District-level People’s Committee in the year 2021; and 389 out of 705 district-level units had publicly disclosed the Land Use Plan for the year 2022 on the electronic information portal of the District-level People’s Committee in the year 2022.

With the public accessible platforms for sharing land planning and land use plans have not garnered significant user engagement, failing to capture people’s attention effectively because the information about land planning and land use plans is often issued later than regulations. Specifically:

- Land use plan files are often incompletely uploaded, scattered across various sections, or posted with inconsistencies and a lack of uniformity.
- Non-standard abbreviations, compressed files, uncommon file formats (such as DGN map formats), ineffective search functionalities, and search tools failing to return relevant results.
- Many localities integrate planning software that lacks a display of legal foundations.
- Instances where seals can be separated from the document, allowing for zooming in or out and editing.
- Users are required to log in to an account to access attached documents or those uploaded on Google Drive, but access permissions for citizens are not granted.
- Approval dates of decisions are inconsistent with the posting date and the date of public notice announcement.

2.2. The right to access information by sending a direct request according to the prescribed form

According to a study on the Publication of Information on District-level Land Use Planning and Plan, along with Provincial Land Price Lists in the Electronic Environment in 2022 [3], a total of 561 requests for information were submitted to 140 district-level units, and the results are as follows:

Feedback results	Year 2021		Year 2022	
	Quantity	Percentage	Quantity	Percentage
Provide	98	17.5%	108	19.3%
Refuse	15	2.7%	6	1.1%
No reply	402	71.7%	415	73.9%
Other	46	8.2%	32	5.7%



Analysis of requests and responses in 2022 showed that:

- Among the 108 responses providing information, 7 agencies used the Request Resolution Form as specified in Template No. 03 of Decree No. 13/2018/NĐ-CP, while 45 agencies included attached official letters along with their responses.

- Regarding the 6 responses of refusal, the reasons are as follows: The information was already disclosed in accordance with regulations; Insufficient grounds for examination; Request sent for the wrong purpose; Letter sent in the wrong format according to Circular No. 34/2014/TT-BTNMT of the MONRE; Requests accompanied by a referral; No specific reason given; the request was forwarded to the District's Department of Natural Resources and Environment for further investigation. The forms of refusal include: 2 written responses of refusal, including 1 response using the Rejection Notification Form - Template No. 05 of Decree No. 13/2018/NĐ-CP; 1 response refusing to provide an answer notification; 4 responses of refusal through phone communication.

- Regarding the other 32 responses: Including notifications of transferring requests to other units for resolution; The response will provide documents, but as of February 21st, 2023, there have been no new responses; General responses indicating information has been publicly disclosed at the office or on the Electronic Information Portal (EIP); Suggesting the requester to participate in a meeting to address the request.

Based on the actual observations, it is evident that most civil servants exhibit courteous behavior, except for one individual who has an unfriendly attitude towards the public. Civil servants attempted to send response documents via postal mail, but they were returned; however, they tried to contact the requester via email to provide the necessary information. Most agencies provided comprehensive publicly disclosed documents rather than just sending the approval decision alone. Some civil servants contact and interact with citizens via Zalo app. There was no occurrence of fee collection as observed in 2021, civil servants explained the cost if document scanning was needed before returning the hard copy to the requester; Many civil servants did not use official email account to respond to citizens requires.

3. PROPOSED RECOMMENDATIONS TO ENHANCE REGULATIONS ON RIGHT TO ACCESS INFORMATION IN LAND USE PLANNING

While there have been improvements in recent years in accessing land information in general and land use planning information in particular, contributing to a better realization of people's ownership rights, certain challenges remain. These include: Many citizens are not fully informed about the procedures to access information on the electronic platforms of relevant authorities; Sometimes, the information posted lacks clarity and transparency, making it difficult for the public to access; Some public servants underestimate the importance of providing information, failing to recognize it as their responsibility; negative issues and bureaucratic hurdles can indeed have a substantial impact on the exercise of people's rights and the enforcement of sanctions. In the case of obstruction, causing difficulties when people want to access information about land use planning and plans is still unclear and ambiguous. Therefore, to ensure the rights of citizens in this field, it is proposed that in the coming time, the following synchronized solutions should be implemented:

Firstly, supplementing the procedures for providing information upon citizens' requests according to the provisions of the Law on Access to Information 2016 into the existing administrative procedures of all sectors and fields (including the field of land); Supplementing regulations on the timing of district-level land use planning approval in the provisions of the Land Law to ensure the timeliness and consistency of land use planning and plans; Specific provisions need to be established in the Land Law, as well as in the implementing guidance documents, regarding the information that must be publicly disclosed and the procedure for collecting public opinions on land use planning and policies.... Not only that but the above information must be regularly updated in a timely manner for people to access if necessary. To achieve this, the competent authorities need to actively review, amend, and supplement the process of operating their websites; Maintain the regulation on the time of land information disclosure (15 days) as in the current regulations (the Land Law 2013) instead of 30 days as in the Draft amended Land Law.

Secondly, the regulation clearly states that the agency holding land information is responsible for providing information when requested by citizens. There should be specific regulations on the responsibilities of individuals and organizations, especially the responsibilities of those in leadership positions, for not providing information inaccurate or misleading information, or engaging in corrupt



behavior when citizens require access to relevant information; Establish regulations on the long-term maintenance of land information that has been posted on the e-portals/websites of state agencies, especially in the context of Vietnam's push for digital Government development; stipulate the requirements for building interfaces, categories, and ways of disclosing information on the Government's web portal in a standardized and synchronized manner across the country.

Thirdly, strengthen and develop online services providing information in the field of land use planning and plan. Of course, these services must ensure a reliable source of accurate and legally valid information, giving citizens confidence in using these services. Currently, Decree No. 01/2017/ND-CP dated January 6th, 2017, issued by the Government amends and supplements several decrees detailing the implementation of the Land Law. This Decree has specific provisions on the conditions for organizations and individuals engaging in the establishment of land information systems. Specifically, for public non-business units and enterprises, they are allowed to establish land database systems when they fulfill the following conditions: (1) Having the function of building land database systems for public non-business units; (2) Having at least 10 individuals for district-level land database system establishment activities and at least 15 individuals for national and provincial-level land database system activities, meeting the technical standards; (3) Having the necessary infrastructure and technological equipment for constructing land database systems as regulated by the Minister of Natural Resources and Environment. In addition, individuals currently employed within above public non-business units and enterprises and are engaged in the construction of land database systems, must satisfy the following conditions: Having full capacity for civil acts; Having a university degree or higher in one of the specialized fields related to land management, cadastral mapping, geodesy, information technology, and other fields related to land databases; Having worked in the field of land resource management or developing land database systems for 24 months or more. Thus, in the near future, in addition to the information provided by competent state agencies, citizens will have additional channels to access information in the field of land, in general, and land recovery, in particular.

Fourthly, continue to disseminate and train the Law on Access to Information 2016, and the content of accessing land information in the Land Law, to officials, civil servants within government agencies and citizens; Building a section about "Access to information" on the portals/websites of governments at all levels; Systematize public information on electronic portals and websites as stipulated, enabling citizens to access it from anywhere, anytime; Add more search functionalities on the portals/websites of governments at all levels, ensuring user-friendliness for all user groups, including the elderly, people with disabilities, and ethnic minorities.

Fifthly, the responsibility of the information provider is extremely important, directly affecting people's right to access information. Therefore, it is necessary to promote and strengthen education, raise awareness, improve professional competence, and expertise of those who are responsible for providing information.

Information is a necessary need of every individual Information directly related to people's lives, production, and businesses affects their legitimate interests, especially matters such as Land use planning and plans which are now more essential than ever before. The time has come for accessing information in this field to be conducted seriously, systematically, with depth, and to bring about practical effectiveness. Implementing the right to access information in the field of planning and land use not only ensures the interests of citizens but also plays a role in serving the state management tasks, meeting the requirements of socio-economic development, accomplishing the goals of striving for the development of a modern national information infrastructure, meeting the requirements of all citizens in the current vibrant fourth industrial revolution ■

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A systems approach for transitioning Southeast Asia to a circular economy

The current trajectory of Southeast Asia's production and consumption resulting from its rapid growth is increasingly putting a strain on the environment. Measures to contain the pandemic have intensified the environmental pressures because of increasing volumes of medical waste, plastics and packaging due to the e-commerce boom and other resource stresses.

AN AMBITIOUS AGENDA

As countries in the region embark on their green recovery agenda in the wake of COVID-19, there is a pressing need to transition from the linear economic model of "take, make, waste" to a circular system. A circular economy (CE) is grounded in three principles: (1) Designing out waste and reducing pollution; (2) keeping products and materials in use; (3) regenerating natural ecosystems. This paradigm shift can bring about economic growth of US\$ 324 billion and create 1.5 million jobs in Asia by 2025, according to a study by the Economic Research Institute for ASEAN and East Asia.

Although the term "CE" may not yet be commonplace in policy-making circles, countries in the region were already introducing various pertinent policies and regulations as far back as the 1990s and early 2000s. However, approaches were fragmented across the region. Given Southeast Asia's strong economic integration, it is imperative to foster coherence in this area by formulating and coordinating circular economic policies at the regional level.

Linear approaches are deeply rooted in our systems and heavily integrated into our communities, economies and national development. The transition to a CE is an ambitious agenda, requiring not only innovative technologies but also massive capital and new business models, coupled with significant behavioral changes.

While circularity has gained traction over the years, the lack of a regulatory framework and incentives inhibit implementation. In some jurisdictions, recycling and reusing materials may be a barrier in pushing circular models due to hygiene and consumer protection laws. In addition, the lack of standards for recycled and remanufactured products may lead to variations in quality and performance of such goods.

Engaging in a CE strategy may also bring difficult trade-offs. For instance, imposing extended producer responsibility can cause suppliers to leave small markets. On the consumer side, there may be options to shift to circular consumption patterns, but these may be considered impractical and inconvenient. Consumer acceptance is a critical factor in scaling circularity, and this could be influenced by the quality of recycled goods and other circular innovations and perception of second-hand or upcycled products.

ASEAN FRAMEWORK FOR A CE

The Association of Southeast Asian Nations (ASEAN) has developed a framework that highlights the role of trade, technological innovations, and financial markets for accelerating the circular transformation. The followings are its five strategic priorities, which set a path for the smooth transition to a CE.

Harmonization of standards and mutual recognition of circular products and services

It is important for ASEAN countries to review existing arrangements in various sectors and harmonize standards to enable trade of circular products and services and facilitate integration between value chains. To mainstream and scale circularity, a broadly accepted definition of circular products and services should be established through the development of a taxonomy, which can help minimize the cost of compliance among businesses and reduce unnecessary regulatory burdens.

Trade openness and trade facilitation in goods and services

Trade rules and regulations need to be overhauled to facilitate the circular transition of economies. Addressing the potential trade barriers is key to ensure the seamless movement of environmental goods and services and the diffusion of circular technologies. There should also be support for businesses in their supply chain management efforts, which may include technical assistance and testing beds for emerging technologies.



Enhanced role of innovation, digitalization, and emerging technologies

Technological solutions and innovations need to be harnessed to accelerate the shift to a CE. Blockchain, for example, can provide a means of traceability of material flows and give information on how the product can be recycled or remanufactured. Knowledge tools—such as databases, directory of relevant institutions or experts, and information materials on best practices or technologies—could serve as useful resources for Government and industry stakeholders in countries that are in the nascent stage of their circular journey.

Sustainable finance and innovative investments

With the rapid growth of various forms of sustainable investments, the finance community plays a critical role in encouraging new business models that support the CE of investments in both linear and circular models. Harmonized sustainability standards are also important to determine the eligibility of initiatives for green funding. In the meantime, governments can drive the shift to circularity by providing subsidies and tax incentives, supporting technological development, and promoting public-private partnerships.

Efficient use of energy and other resources

The sustainable use of energy underlies all economic activities in a circular economy. Therefore, focusing on reducing energy use and the adoption of renewable sources are vital to promoting a CE. Businesses, especially small enterprises, could benefit from capacity building programs on how to green their production processes as well as monitor and report their carbon performance.

ADB-SUPPORTED CIRCULAR INITIATIVES

Asian Development Bank (ADB), through its multidisciplinary approach, identifies CE entry points and delivers integrated solutions to its government clients. In particular, ADB is taking a programmatic approach to help communities along the Yangtze River Economic Belt in the People's Republic of China achieve water secu-



▲ *Circular systems can help cities address their growing garbage problem*



riety and green development and increase their resilience. ADB's multisectoral support seeks to stimulate economic development of the Yangtze River Basin while promoting the sustainable use of natural resources in line with the CE approach to reduce resource inputs, waste outputs, and pollution.

In addition, ADB is supporting various waste-to-energy (WTE) projects, which helps manage the growing volume of urban waste while increasing energy generation from renewable sources. In Việt Nam, ADB is supporting the construction and operation of a series of WTE plants with advanced clean technologies in multiple municipalities. This is the first municipal WTE public-private partnership project in the country.

Since the ocean economy represents 20% of the gross domestic product of some Southeast Asian countries, ADB's Promoting Action on Plastic Pollution from Source to Sea aims to address marine plastic pollution and support its member countries as the Global Plastics Treaty is designed and implemented. This technical assistance includes demonstration projects in Indonesia and Vietnam that are designed to support the transition to a circular plastics economy and improve waste management, with a focus on increasing the quality of recycling and value of plastics. Regional and subregional cross-learning and knowledge sharing are also key activities of this project.

RECOMMENDATIONS

An integrated systems approach can help ensure a successful transition to a circular economy. The followings are recommendations for the consideration of policy makers.

Plan for trade-offs in the policy design process

Not only are policy design and decisions on CE disrupting established markets, systems, and supply chains, but the circular nature of the outcome means that there is far more time for both positive and negative emergent phenomena to manifest. While mitigating measures can be formulated to counter any potential adverse impacts of circular interventions, policy makers need to be agile to manage unforeseen trade-offs. Developing modelling techniques to capture the complexity of our systems is a challenge, but the advances and capabilities of modern technologies offer a major opportunity for understanding circular transitions.

Enact holistic and integrated policies that address opportunities and challenges from both the demand and supply side

The circular transformation calls for holistic policies with a shift in mindsets and multistakeholder collaboration at all levels. Within organizations, interdisciplinary approaches are crucial to the development of circular innovations. Within industries, collaboration on resource optimization can allow one industry to extract value from waste or by-products of another. Moreover, the circular transition is contingent on partnerships between governments and the private sector, which can help identify and finance capital-intensive solutions. Finally, companies need to work with consumers to gain insights into their perceptions and behavior when developing circular solutions.

Develop systems for knowledge sharing and build the capacity of stakeholders

Information sharing is essential for deepening the understanding of this evolving trend. As the library of CE transition projects and technological solutions grows, common success factors and areas for improvement can be identified. For businesses and workers, capacity building and reskilling are essential to help them apply circular principles in production processes. Standardized methodologies and tools are also necessary for evaluating their performance and measuring their progress ■

CHAU LONG

(Source: Development. Asian)

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Integrating a market-based approach to biodiversity conservation

The Qinling Mountains in the People's Republic of China (PRC) is a global biodiversity hotspot and one of the country's most critical ecological function zones that supports many endangered, rare and endemic plants and animals. More than 60% of the estimated 15.7 million people who live in the mountains rely on farming and agricultural production. The high level of land-use pressure in the area and nature reserves created an urgent need to conserve Qinling's ecosystem.

A project co-financed by the Asian Development Bank (ADB) and the Global Environment Facility (GEF) introduced market-oriented measures to enhance the environmental management while promoting sustainable livelihoods for local communities.

CONTEXT

Located about 45 kilometers (km) Southwest of Xi'an - the Capital City of Shaanxi Province, the Qinling Mountains has high levels of endemism. It is home to about 20% of the PRC's wild giant panda population, and the only known wild population of the crested ibis - one of the world's rarest birds. The water resources from the mountain range are integral to the watersheds of the Yangtze and Yellow rivers. About 70% of all vegetation types in the country can be found in this range. Poverty incidence in the area is high - about 37% of the total population - due to limited profitable and sustainable income generation opportunities.

CHALLENGES

Heavy reliance on agriculture and competing land uses, particularly in the hilly areas of Qinling, have caused significant environmental, land, and biodiversity degradation. The land-use pressure also brought ecological conservation into conflict with economic development efforts of local communities.

Previous donor- and Government-funded projects intended to address land degradation and related issues have supported rural livelihoods and land management in some areas but did not lead to sustainable environmental and human resource benefits once project funding ceased.



▲ The number of wild crested ibis in the Qinling Mountains increased by 52% in 2019 from 2010 because of improved ecosystem management

SOLUTIONS

The Shaanxi Qinling Biodiversity Conservation and Demonstration Project introduced a market-based approach that integrates biodiversity conservation with sustainable revenue generation and land and conservation management. The approach involves measures that provide incentives for local communities to participate in biodiversity conservation by creating income opportunities from ecotourism businesses promoted under the Project. Ecosystem service provision is aligned with the interests of individuals who comprise the market to reduce the dependency on unsustainable mechanisms.

Promote participatory biodiversity management and sustainable livelihood in the mountainous area

The Project established the Qinling National Botanical Garden (QNBG) - the first national-level botanical garden in the PRC, initiated jointly by the Shaanxi Provincial Government, State Forestry Administration, and Chinese Academy of Sciences. About 4,000 ha of state forestry lands were placed under its management.

Certificates for forestry conservation and other practices for more than 6,000 ha were awarded to individual households. The Project also supported the development of species management programs for four globally threatened animal species - the giant panda, the golden monkey, the golden takin, and the crested ibis. The QNBG built or upgraded community infrastructure, including 18km of roads along the Tianyu River; more than 120km of mountain paths; and village facilities supporting home-based ecotourism, such as solar lighting stands, water supply, and ecological toilets for 160 households. The Project promoted small



income-generating businesses, such as the sale of local fruits and other goods. Local communities implemented conservation agriculture on about 35 ha and ecological forestry rehabilitation on about 70 ha with support from the QNBG. Ecotourism business and conservation programs provided alternative but sustainable livelihoods for local communities, which eventually lessened pressures on the lands and biodiversity.

Strengthen biodiversity conservation in the plains area

Covering a total area of about 63,900 hectares (ha), the Project strengthened the ecosystem management in the Qinling Mountains, increased rural incomes, and reduced poverty. The Project also rehabilitated the Shaanxi Animal Rescue Center (SARC) following international standards and good practices for botanical gardens and wildlife conservation. In addition to their conservation functions, the QNBG and SARC provide state-of-the-art ecotourism products and services. Their revenues are reinvested for sustainable financing and conservation of the broader mountainous area.

About 260 ha of botanical gardens were established at QNBG, including 22 specialized gardens and associated public education facilities, such as a public educa-

tion center, a herbarium, and two outdoor education camps. Designated as a national and provincial nature education base, the QNBG was visited by over 80,000 students from 2017 to 2019. Research facilities such as laboratory, animal hospital, public education center, and tourist information center were installed at SARC. These also include the breeding and exhibition areas for endangered animals.

Enhance institutions and capacities

Through the GEF grant, the Project supported the development of an integrated ecosystem management strategy and action plan, including policy recommendations for the establishment of a national park system (a comprehensive nature and ecosystem management regime being promoted by the Central Government) in the Qinling Mountains. A species monitoring system was established under SARC, including a field-based monitoring patrol station. Ecological baseline monitoring and a database were also created for the QNBG. Moreover, the Project provided training programs and offered job exchange opportunities for technical conservation staff and implemented a replication and conservation awareness-raising program.

RESULTS

Improved biodiversity conservation and livelihoods

The systematic management of over 10,000 ha of forestlands in Qinling has helped reduced land degradation and soil erosion. Mainstreaming the management of globally threatened animal species into Government conservation programs has increased the population of the four endangered wildlife species from 2010 to 2019.



▲ In the Project area, the number of golden takins increased by 150%, crested ibis by 52%, golden monkeys by 71%, and giant pandas by 27%



▲ The QNBG has become a major ecotourism destination and a major public education center for school kids

About 1.1 million ecotourists visited the Project area in 2019; Rural incomes have increased by 140% in 2019 from 2010. Households in the mountainous area have been lifted from poverty by 2019; Project-related activities generated more than 1,500 jobs. Over 300 jobs were created directly by QNBG and SARC operations. The rest are through small-scale ecotourism enterprises within local communities, such as home-stay ecotourism enterprises that are in operation since 2016.

Enhanced ecosystem management and institutional capacity

The Project supported policies that promote long-term ecosystem management, habitat management and action plans, and updates on Provincial regulations for Qinling Ecological and Environmental Management. Through the project's initiative, the Provincial Government prioritized the National Park system for the Qinling Mountains. The plan for the Qinling National Park has already passed an expert panel review in October 2020. Science-based capacity development for local agencies has also strengthened the management conservation, baseline database and monitoring, species management plans, and scientific courses for public education. Around 300 staff were trained on conservation and habitat management through on-the-job training at professional institutes such as the Royal Botanic Gardens, Kew and the Durrell Institute of Conservation and Ecology in the United Kingdom and the Chicago Botanic Garden in the United States.

LESSONS

Firstly, integrating market-oriented interventions has helped generate revenues from ecotourism in the demonstration area and through the conservation of natural ecosystems. Innovative regulations, enhanced institutions and capacities, and strengthened enforcement mechanisms are crucial for market-driven environmental management systems.

Secondly, Government support is necessary when integrating local community livelihoods with conservation efforts.

Thirdly, the integrated environmental management strategy and action

plan served as a critical scientific basis for Government policymaking to improve ecosystem management of the Qinling Mountains through the establishment of a national park system.

Fourthly, the Project's designed interventions for institutional capacity and policy development can be replicated within and outside the PRC ■

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NAM VIỆT

(Source: Asian Development Bank)



EcoBrick - A circular economy solution to transform plastic waste into sustainable concrete

A startup based in Hong Kong, China has developed a circular economy model for a plastic waste solution that promises to transform the buildings sector. EcoBricks upcycles plastic waste from buildings and from construction projects, such as old washing machines and PVC, that would otherwise end up in landfills or dumps or pollute oceans. The Company's objective is to recycle local plastic waste into industry-grade concrete products for local construction projects, which can then be fully recycled into new bricks at end of life. It is offering a solution to an industry that is coming under increasing pressure to become more sustainable across its whole value chain.

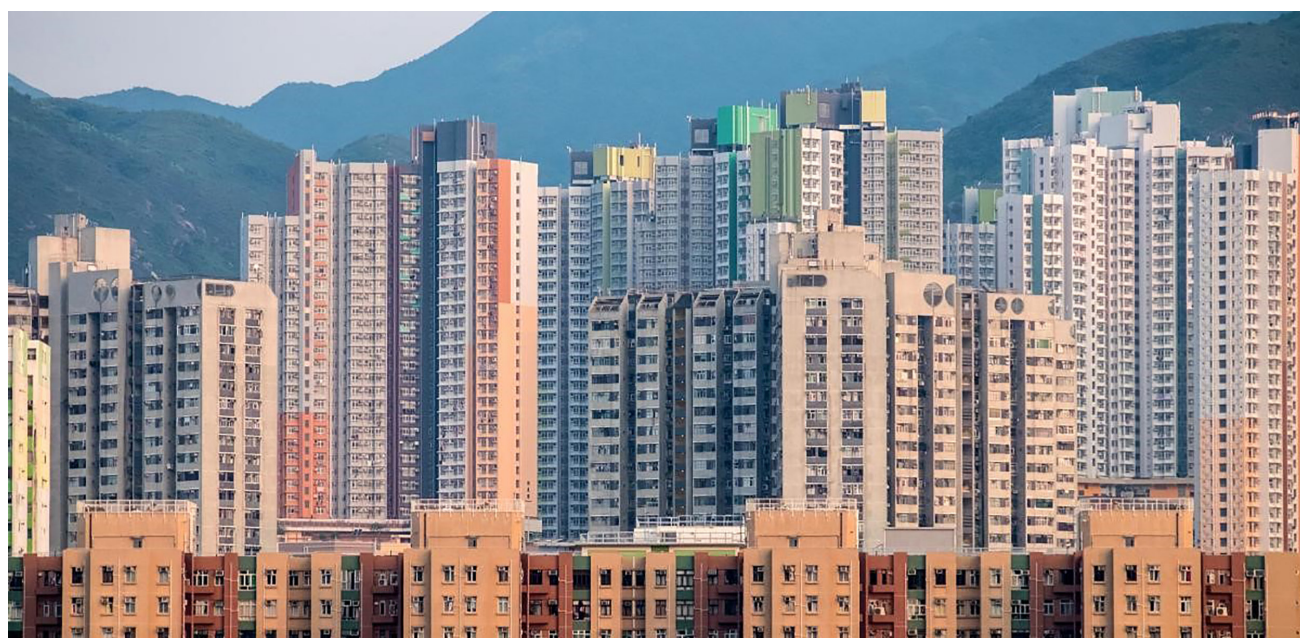
FINDING SOLUTIONS TO MAKE THE BUILT ENVIRONMENT MORE SUSTAINABLE

There is a common misconception that achieving zero carbon and zero waste are separate and distinct, but these two environmental challenges are inter-related. Zero emissions cannot be reached without addressing the growing waste problem. A big part of the problem is the built environment (houses, schools, workplaces, commercial buildings), which uses energy to heat, cool and power itself. It is the single biggest source of waste generation, including plastic waste, and a major contributor to greenhouse gases, with carbon emissions generated during the construction, lifespan, and operation of a building as well as from the disposal of building materials.

The construction industry consumes large amounts of natural resources, particularly sand for the manufacture of concrete. Consumption is growing at an unprecedented rate as urban sprawl continues across the world. It is estimated that there will be 230 billion square meters of new building stock between 2016 and 2060, and every new building will consume more extracted materials (sand, gravel) and generate more waste during its construction and operation. So, finding a solution to make the built environment more sustainable will have a significant impact toward reaching zero waste and zero carbon emissions targets. At the same time, finding sustainable materials is essential to meet the demand for construction in the next decades.

RECYCLING THE UNRECYCLED

EcoBricks has rolled out in Hong Kong, China a concrete solution that replaces virgin materials with local waste materials and seeks to match or outperform conventional concrete. The recycling of plastic waste is 100% cold and clean. The process does not heat, melt or chemically treat plastic, which means far less energy is used, and there is no effluent pollution or chemical byproduct. Manufacturing is low energy and low emission.



▲ The buildings sector is the single biggest source of waste generation and a major contributor to carbon emissions



A key factor is that it does not compete with other recyclers in the existing recycling ecosystem because it focuses on plastic waste that is not recycled and ends up in landfills, which makes up 89% of plastic waste collected. It works with large waste managers and recyclers to take waste that they cannot process or recycle or do not want. The ratio of recycled plastic waste versus unrecycled is largely the same the world over, making this type of solution relevant to other countries.

Plastic waste used in making the bricks includes PVC, which has few recycling solutions, concrete waste, glass waste, and locally sourced cement substitutes, which are currently being tested. Alternatives, such as pulverized fly ash from coal power plants or granulated blast slag from steel mills, may be used in other countries if locally available.

By replacing raw materials with local waste materials, the ecological harm caused by mass mining, abstraction, and transportation of heavy materials across long distances is avoided. The bricks are used in local construction projects to demonstrate the importance of recycling to local communities. Any waste generated, including the bricks, can be recycled back into bricks. So, the goal is zero waste from start to finish.

To quantify how much plastic waste can be recycled, just one football pitch of EcoBricks paving is the equivalent of 14.3 million plastic bottles upcycled. The Company's first project is in the Gold Coast Piazza development of Sino Group in Tuen Mun, where it delivered more than 15,000 bricks, which were upcycled from 5.4 tons of plastic waste from 560 old washing machines.

A CIRCULAR ECONOMY MODEL

In developing a solution, EcoBricks looked at the circularity of the product and the building sector. This means working with partners in collecting waste from the buildings that clients have built, using these as raw materials to make concrete products for their new buildings, and pricing concrete products competitively. When clients renovate their buildings, they can send the concrete waste to EcoBricks. This model helps both customers and the industry to become circular even in one of the costliest real estate markets in the world. It saves them the cost of the landfill levy. The Company conducted a life cycle assessment under the ISO 14040 framework to quantify the savings from using local waste materials versus using virgin materials to produce a conventional concrete brick. The study showed that it can reduce the carbon footprint of concrete products by up to 41%, making it possible to make concrete, the world's most consumed man-made material, more sustainable.

Such a solution is critical to the building sector because of the irreversible macro-economic tailwinds that it is facing, which means the future of the industry must be more sustainable, circular, and low waste. That pressure is coming from multiple directions. To deliver on the ambitions of the Paris Agreement, the global target for 2050 is net zero embodied carbon for new buildings, infrastructure, and renovations and net zero operational carbon for all buildings.

The level of investor activism is high, with asset managers and stakeholders pressuring companies they invest in to improve their sustainability credentials and provide detailed disclosures of their entire value chain.

The biggest ESG (environmental, social, and governance) reporting challenge for property developers is providing data on where their building materials come from or where the raw materials for those building materials come from. It is hard to get data because the supply chain is fragmented and opaque. This is where the circularity proposition is powerful. The closer the supply of raw materials and products are in terms of locality, the more transparency there is, and the easier it is to get verifiable and auditable data - from raw material to finished product to end of life.

There are sticks as well as carrots that encourage industry to transform its business model. In Hong Kong, China, where construction is driven by the private sector, the industry is creating incentives to become more sustainable. These include industry rankings and accreditations, such as LEED and BEAM Plus, which give scores of how much waste is recycled.

Ranking high comes with tangible and intangible benefits. Companies are allowed to develop larger areas if their projects have smaller carbon footprints. They help prevent plastic waste from leaching into the natural environment, such as microplastics in oceans, which have direct negative impacts on the ability of the natural world to serve as a carbon sink and on human health. Building a product that is tangible and integrated into local buildings also helps build trust among local communities in the recycling ecosystem and promotes a circular economy ■

HOÀNG ĐÀN

(Source: Development.asian)



Expanding payment mechanisms for ecosystem services to bolster conservation efforts

The efficacy of such payment schemes for ecosystem services has been proven through their successful implementation in forest ecosystems across Viet Nam.

In a bid to enhance the conservation and restoration of natural ecosystems and diverse wildlife within the country, the application of payment mechanisms for environmental services rendered by forests is being recommended for broader ecosystems.

Mrs. Tran Thi Thu Ha, a member of the Vietnamese Academy of Forest Sciences, which falls under the management of the Ministry of Agriculture and Rural Development, said that these payment methodologies could effectively stimulate and harness resources for this vital cause. According to Mrs. Tran Thi Thu Ha, the efficacy of such payment schemes for ecosystem services has been proven through their successful implementation in forest ecosystems across Viet Nam.

The Forest Protection and Development Fund has been instrumental in deploying the payment for forest environmental services model. This approach has facilitated resource augmentation for the forestry sector, bolstered revenue streams for forests, lightened the fiscal burden on the State, enhanced the effectiveness of

forest protection and development efforts, and fostered income and livelihood avenues for communities residing in mountainous regions, explained Mrs. Tran Thi Thu Ha.

In light of these accomplishments, she emphasises the importance of expanding this payment structure to encompass other ecosystem services. This would drive revenue generation for the conservation and restoration of ecosystems and wildlife species that are currently inadequately supported by the State's budget, she added. Leveraging the knowledge gained from the application of payment mechanisms for forest environmental services, Viet Nam now sets its sight on extending this model to a variety of other ecosystems, such as marine and wetland environments.

While the country has initiated similar programs for these ecosystems, Mrs. Tran Thi Thu Ha highlighted that comprehensive payment mechanisms for their services remain absent. To date, Viet Nam has incor-

porated payments for certain ecosystem services. These encompass fees for sightseeing within protected marine and wetland areas, a shared management model for aquatic resources, and the promotion of eco-friendly aquaculture practices within select coastal regions. These efforts have been facilitated through collaborations with international organisations and pertinent sectors.



▲ A corner of Dam Bay Mangrove Forest in Vinh Nguyen Ward, Nha Trang City in Khanh Hoa



▲ *Tra Su Melaleuca Forest is home to dozens of bird species in the Mekong Delta Province of An Giang*

However, she cautioned that the longevity of many such payment models is threatened due to a lack of a clear legal framework. Amid this backdrop, environmental specialists have emphasised that the existing State budget is insufficient to meet the pressing needs of biodiversity conservation. They argue that the advent of new financial structures and policies is indispensable to draw additional resources. The active participation of local communities and the business sector is deemed crucial to fortify investment in biodiversity preservation.

It needs mechanisms for certificates and credits for biodiversity, mechanisms for accessing carbon credit markets, mechanisms for debt swaps for nature conservation, biodiversity, green bonds, green credits, and establishment of biodiversity funds such as funds for the conservation and restoration of ecosystems.

According to Mr. Dao Xuan Lai, who heads the Climate Change and Environment Unit at the United Nations Development Program (UNDP) in Vietnam, payment for ecosystem services is globally acclaimed as an effective policy instrument for the management of natural resources, utilised with success in several countries worldwide. Such programs have been widely implemented across a diverse range of ecosystem services worldwide, encapsulating areas such as biodiversity conservation, watershed services, carbon sequestration, and landscape aesthetics.

He further noted that the collective annual value of ecosystem service payment programmes on a global scale is estimated to exceed a staggering US\$ 36 billion. He expressed optimism that the launch of initiatives to promote ecosystem services could significantly aid the revival and restoration of biodiversity and ecosystems

within Vietnam. He added that these initiatives could also provide tangible contributions towards the fulfilment of biodiversity targets that Viet Nam has pledged to achieve under the Global Biodiversity Framework. This framework was launched at the 15th Conference (COP15) of the Parties to the Convention on Biological Diversity.

Director of the Institute of Strategy and Policy on Natural Resources and Environment Nguyen Dinh Tho said that as per Clause 1, Article 138 of the Law on Environmental Protection 2020, payment for natural ecosystem services implies that entities or individuals who utilise these services must remunerate those who facilitate environmental and landscape values created by such natural ecosystems. He explained that the funds thus accrued would be utilised to safeguard, sustain, and enhance the natural ecosystems.

Services provided by natural ecosystems that qualify for such payments encompass the environmental aspects of the forest ecosystem in alignment with the Forestry Law, wetland ecosystems utilised for tourism, leisure, and aquaculture; marine ecosystems serving similar purposes; mountain ecosystems, caves, and geo-parks catering to tourism and entertainment and natural ecosystems which facilitate carbon sequestration and storage.

He further clarified that the Law unequivocally prescribes the *modus operandi* of payment for these natural ecosystem services. Accordingly, entities and individuals exploiting these services are obligated to pay directly to those providing these services, through a contractual agreement between the two parties.

For indirect payment scenarios, entities and individuals availing natural ecosystem services are required to remunerate the service providers via an entrusted model through the Provincial Environmental Protection Fund, or the Viet Nam Environmental Protection Fund in instances where a provincial fund is unavailable, he noted ■

NGUYỆT MINH

(Source: *Vietnamnews.vn*)



Center of Global Green Network

KEITI creates a clean and green world by disseminating eco-friendly technologies and establishing global cooperation networks so that every country can enjoy the benefits that the environment offers.

Vietnam - Korea Environmental Cooperation Center - VKECC is an agency established by the Ministry of Environment of Korea that assigned Korea Environmental Industry and Technology Institute (KEITI) the following functions and tasks:

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- Manage funding sources to support cooperation and investment promotion, technology transfer in the field of environmental infrastructure development and new energy (water supply, wastewater treatment, renewable energy, emissions management, ...);

- Support Korean and Vietnamese enterprises to promote investment in the field of environmental industry in Vietnam;

- Research and explore the technology market in order to serve the promotion and cooperation development, investment and technology transfer in the field of environment and sustainable development.



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Chief representative: Mr. Lee Jae Kwon

PHOTO CONTEST 2023 CIRCULAR ECONOMY 2023

TẠP CHÍ
Môi trường



Time of event: From July 15th, 2023 to August 24th, 2023

PHOTO CONTEST 2023 - CIRCULAR ECONOMY

To search for outstanding photographic works that convey the benefits and importance of the circular economy in using natural resources, reducing pollution, environmental degradation, and responding to climate change. At the same time, the contest can create a driving force to improve the quality of information and propaganda about the circular economy on mass media.

PARTICIPANTS

- Vietnamese citizens and foreigners working and living in Vietnam; from 18 years old or above, not violating the provisions of law.
- Members of the Organizers and the Judges are not allowed to participate.

CONTENT

Reflect the circular economy model, with the following contents:

- Reduce exploitation and usage of non-renewable resources and water resources; increase efficiency in usage of natural resources, raw materials and energy-saving materials;
- Extend the life of materials, equipment, products, goods and other components;
- Limit waste generation and minimize adverse environmental impact, including: reduce solid waste, water waste, emissions; reduce the use of harmful chemicals; waste recycling, energy recovery; reduce single-use products; green shopping;
- Develop and use clean energy and renewable energy according to the provisions of law;
- Industrial symbiosis activities in accordance with the regulations on management of industrial parks and economic zones;
- Apply environmentally friendly transportation solutions, reduce greenhouse gas emissions.

PRIZE STRUCTURE

- 1 First Prize: 10 million VND.
- 2 Second Prizes: 7 million VND each prize.
- 2 Third Prizes: 5 million VND each prize.
- 5 Encouragement Prizes: 1,5 million VND each prize.
- Selected exhibition photos will receive a royalty of 500,000 VND per artwork.

THE JUDGES

Representative of the Ministry of Natural Resources and Environment; Representative of the Ministry of Culture, Sports, and Tourism; Representative of the Vietnam Association of Photographic Artists; Representative of C asean.

❖ **Awards Ceremony:** At C asean Vietnam venue in Hanoi (Melia Hotel lobby, 44B Ly Thuong Kiet, Hoan Kiem, Hanoi)

❖ **Estimated Award Timeline:** 9:00 am on 21st September 2023

❖ **Contact details:** - <http://anhkinhtetuanhoan.com>

- <http://tapchimoitruong.vn>