MAGAZINE
Environment
ISSN:2615 - 9600
English Edition I - 2023
INSTITUTE OF STRATEGY AND POLICY ON NATURAL RESOURCES AND ENVIRONMENT - MONRE

Deputy Prime Minister Trần Hồng Hà presents at the National Assembly full-time deputies' meeting to discuss on the (amended) Land Law Project on April 6th, 2023

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PUBLICATION PERMIT
No 192/GP-BTTTT - Date: 31/05/2023

Photo on the cover page:
Deputy Prime Minister Trần Hồng Hà delivers a speech on the Law on Land (amended) project at the National Assembly full-time deputies' meeting to discuss a number of Law projects to be submitted to the National Assembly at the 5th session on April 6th, 2023
Photo by: *VNA*
Design: *Hoàng Đàn*
Processed & printed by:
P&Q Printing and Trading Joint Stock Company
English edition I/2023
Price: 30.000VND

Website: www.tapchimoitruong.vn

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Natural capital depreciation, pollution damage and total factor productivity

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***Abstract**: Green transition and digitalization help to address some of the key market failures that are hindering the transition to a circular economy, improving total factor productivity and resource efficiency. Green transition, digitalization, data, information and knowledge help improve the existing circular economy model and enable the development of new circular business models and best practices. The Government needs to establish a policy framework that supports promoting digital circular activities while minimizing the risks that these activities bring.*

***Keywords:** Green transformation; Digital transformation; IGTFP*
***JEL Classifications:** D24, E31, J21*
***Received:** 02 May 2023; **Revised:** 15 May 2023; **Accepted:** 24 May 2023*

1. Green transformation, digital transformation and inclusive green total factor productivity

Productivity is defined as the ratio between output and input. Productivity gains are a key determinant of the ability to supply adequate, nutritious food from available land, capital and labour. Productivity involves using available resources in the best possible manner to produce something more efficiently. Total factor productivity (TFP) is a ratio of a measure of total output to a measure of multiple inputs. Partial factor productivity (PFP) is a ratio of a measure of total output to a measure of a single input. Increases in TFP play an essential role in economic growth and raising incomes. TFP calculations include inputs and outputs that have methodological and data challenges. Important productivity factors include the nature and quality of materials and natural resources; the basic nature of the processes/ procedures employed; the amount of plant and equipment employed within the process; the efficiency of the plant and equipment; the volume, continuity and uniformity of production operation; utilization of a labor force. Technical progress is the essential determinant of growth. Technological change and technical efficiency improvements reallocate resources across sectors, contribute to economic growth, generate extra real income and employment, raise living standards, avoid pressure on natural resources and address social goals, including environmental problems. The circular economy involves the requirements of designing out wastes through improving the basic processes via research and development, providing additional and improved physical means of production, equipment and product, methods of operation, organization, planning, and control, manpower effectiveness at all levels.

Traditional TFP only considers the contribution of capital and labor input to economic growth, ignoring the natural capital and the pollution that damages the environment. Inclusive green total factor productivity (IGTFP) places a high priority on climate change mitigation, taking the input of natural capital and the output of pollutants into account. Productivity and carbon sequestration can be achieved through enhanced husbandry management and practices, cutting emissions by possibly 20 - 30%. Robert Gordon (2000) stressed the important of TFP growth in improving American well-being as the combined influence of globalization, global warming, and pollution constitutes an important drag on future growth. Extreme weather events caused by climate change will decelerate future economic growth. Weitzman (1976) pointed out that the maximum attainable level of consumption could be maintained forever without running down capital stocks. Solow (1986) handles Hartwick's rule as a way of maintaining the capital stock intact to keep real consumption constant over time. A measure of Net National Product (NNP) should take into account the value of natural capital depreciation, pollution damage and account for nonmarket amenities such as parks, landscape, nature, and recreational access (green NNP = NNP - natural capital depreciation - pollution damage + nonmarket amenities). Genuine savings contain gross and net saving/investment, depreciation of natural capital, education expenditure, TFP and pollutants such as CO_2 emissions. Positive or Negative changes in inclusive (comprehensive) wealth are indicators of sustainable or unsustainable economic activity.

The standard producer theory can define the technical link between inputs and outputs using production technology. Productivity of complex farming systems can be measured by biomass (agronomic) yield or income as a simple productivity or TFP because a large number of crops are grown simultaneously on the same piece of land and often harvested at different times. Conventional technology can manage the desired outputs. Productivity of mixed cropping systems can be measured by land equivalent ratio (LER), area × time equivalency ratio (ATER), resource-use efficiency or carbon dynamics. Undesired outputs, on the other hand, require special attention in efficiency analysis. The set of environmental production technologies can be included as climate change and weather risks are more likely to be greater in coming years. Green TFP was not quantified in previous studies. Existing studies have overlooked the intertemporal element of agricultural emissions. Environmental issues, such as air pollutants (CO_2, CH_4, N_2O, SO_2, NO_x, PM_{10}, $PM_{2.5}$, NMVOC, CO) can be explored. Green resources and green technologies are limited by geographical distance, market segmentation, and information asymmetry. Green productivity would improve through interventions and technology use. The new digital infrastructure breaks through the geographical constraints of green resource allocation and green technology flow, connects the supply and demand sides via AI, IoT, big data, cloud and other information technologies. Producers should design new farming methods to cope with extreme weather events, such as prolonged drought, excessive moisture, or extreme heat, or even to change crops produced on their farms.

The Labor Party Manifesto (2019) lays out a plan to transform Britain's society and economy to tackle climate change through the Green Industrial Revolution on the basis of investments in the circular economy, renewable energy and low-carbon infrastructure while rethinking agricultural subsidies to prioritize conservation and recovery natural habitat. The European Commission has announced the focus of its strategy to lead the green industrial revolution through a circular economy in the creation of clean technology products and access to raw materials needed for the green transition. Global investment in green transition will triple by 2030 from US$ 1 trillion in 2022.

The world's consumption of raw materials is expected to nearly double by 2060. This is especially alarming because the extraction, processing, use and management of natural resources and natural resources lead to considerable pressure on the environment. The circular economy aims to convert the current linear economy to a circular model to reduce the consumption of finite natural resources by recovering materials from the waste streams. Deposit return systems (DRS), supplemented by mandatory extended manufacturer liability (EPR) policy tools, can encourage eco-design and improve the quality and quantity of reuse and recycling.

The circular economy provides the backbone for public policy to support industrial development in the context of environmental and social concerns. The final challenge for sustainable development is to decouple economic growth from the exploitation and depletion of natural resources. The Green Industrial Revolution promotes industrial progress, economic growth and diversification in a socially inclusive and environmentally friendly manner. Resolution of the 13th National Congress of the Party identifies building a circular economy as one of the country's development orientations for the period 2021 - 2030 to achieve the goals of sustainable production and consumption development. The Law on Environmental Protection in 2020 has institutionalized a number of mechanisms and policies to promote the circular economy, such as in the use of economic tools and policies such as natural resource taxes, environmental protection fees; green procurement, green credit, green bonds, carbon market development, environmental industry development, environmental services; segregation of waste at source, collection of waste fees based on volume, recycling and reuse of waste; extended producer responsibilities...

2. Green transformation, digital transformation is an opportunity to improve the IGTFP in Vietnam

A circular economy is a sustainable consumption and production model that promotes sharing, renting, reusing, remodeling, refurbishing and recycling existing materials and products for as long as possible. The circular economy reduces the use of materials, redesigns materials, products and services to use less resources, and reuses "waste" as a resource to produce materials and products. Unlike the linear economy, the circular economy circulates resources throughout the entire value chain from investigation, exploration, exploitation, processing, and manufacturing to distribution, consumption, classification, collection, transportation, storage, reuse, recycling, remanufacturing and recycling of waste. With a circular economy, the value of resources is preserved, the raw materials needed to create new products are maintained. The circular economy directly impacts total factor productivity through improving productivity, increasing value added and reducing costs, and replacing intermediate inputs, including raw materials (primary or secondary), energy (fossil or renewable) and other goods and services necessary for sustainable production and consumption.

The circular economy's greatest contribution to IGTFP is the redesign of industrial processes at an early stage.

Applying green transformation, digital transformation to design, share data, connect and communicate in order to realize industrial symbiosis based on the circular economy model in ecological industrial parks. Circular economy models often rely on reverse supply chains and reverse logistics to close material loops, such as recycling waste while extending product life by promoting reuse, repair, refurbishment. Such activities can extend beyond borders and require cross-border movement of end-of-life products to deliver economies of scale. Digital transformation is a tool to help increase TFP, increase output value faster than inputs. Digital transformation provides access to large volumes of data and community resources allowing policymakers to identify priority areas and make policy decisions based on big data. Digital transformation supports policy design and reshapes government-citizen interactions. Digitization offers new tools for governments to more effectively test design and evaluate policy. Smart waste segregation and collection system, powered by IoT and sensors, help increase efficiency and improve the quality of waste segregation and collection services. The synergy of real-time systems, machine learning and artificial intelligence is the basis for improving the IGTFP through reducing time and human resources, management costs.

3. Solutions to promote IGTFP in Vietnam

At the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26), Vietnam pledged to bring net emissions to "zero" by 2050. In the Nationally determined contributions (NDCs) updated in 2022, Vietnam aims to reduce its total greenhouse gas emissions by 43.5% compared to the BAU scenario by 2030 with international support, a remarkable increase compared to the NDCs 2020 (27%). At the fifteenth meeting of the UN Biodiversity Conference of the Parties (COP15) held in Kunming, China and Montreal, Canada, Vietnam and 190 countries approved the historical "Kunming-Montreal Global Biodiversity Framework". Vietnam is the third country to reach an agreement to establish a Just Energy Transition Partnership (JETP).

IGTFP is crucial to improving environmental quality and sustainable development. Green transition and digitalization have a significant improvement effect on IGTFP. Green technology innovation and factor allocation optimization help reduce environmental and resource problems and enhance rapid economic growth. Ecological crises and environmental problems can only be addressed through green transition and digitalization to achieve the coordinated development of the economy, resources and the environment. IGTFP can only be achieved by green technology innovation and green resource allocation optimization.

Green transformation and digitization help transforming the current linear economy to circular economy, by transforming circular value chains, changing market structures and operations, enabling the creation of platforms and ecosystems, adjusting the consumer behavior and raising public awareness about climate actions and protecting environment, increasing the likelihood of value retention and mitigating negative environmental externalities. Combining physical and virtual assets, digital transformation acts as a driving force for creating value, improving labor productivity, and aggregating factors through the establishment of digital and operating platforms, integration and sharing of data among ministries, localities, helping improve the quality of public service delivery.

Digital transformation helps reduce transaction costs, traceability, of products and goods, materials, waste streams of plastic, metal, oil and lubricants, rubber, glass, wood, paper and other biomass…; the quality of secondary materials for reusability and recycling of goods and materials in the value chain can be improved; Component and product tracking for maintenance, repair, reuse, recycle and remanufacture can be made easy. Besides playing an important role in circular business models, digital transformation, digital innovation and the adoption of digital solutions help improve circular economy policymaking. To make this linkage a reality, Central and local governments need to research and explore data-driven approaches to better predict environmental and social trends and needs, integrate circular economy model into strategies, master plans and plans of ministries, sectors, localities and enterprises to make circular economy policies towards the goal of improving the IGTFP ■

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Performance evaluation of acidic water treatment by using simple physicochemical method

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***Abstract**: One of the major issues in the Mekong Delta is the severe deficit of supply water due to the ferrous, alum and acidic pollutants of water in this area. This study aims to assess the performance of some popular methods to treat acid sulfate water, such as using quicklime with a solution pH range of 6 - 8 as an operating variable. Simulated acid sulfate water samples were prepared based on studies of acid sulfate content in the water of this area. The results showed that: pH of 7.5 was determined to be an optimum for Al and Fe removal as qualified standards (QCVN 01-1:2018/BYT); At any values of pH, only a small amount of Mn was ydrolysed, which means after treatment, Mn was hardly removed from the solution. The result indicated that although traditional methods can treat Al and Fe, it is necessary for the water to have further treatment as the methods cannot eliminate the entire Mn and they also may heighten the hardness of water.*

***Keywords:** Arsenate; Iron hydroxide-based adsorbent; Competing anions*

***JEL Classifications**: K32, N55, Q53*

***Received:** 01 March 2023**; Revised:** 03 March 2023**; Accepted:** 22 April 2023*

1. Introduction

Acid sulfate soil (ASS) is the main kind of soil in the Mekong River Delta (Vietnam), approximately 400,000 ha (occupying more than 40%) of the total area here [1, 2, 3]. ASS is consequence of drainage, which develop from the oxidation of reduced S-compounds in Pyrite (FeS_2) [1,4]. Acid sulfate water (ASW) is the result of the aerobic leaching of sulfide-bearing rock, sediment, and soil into the surroundings [5] that releases sulphuric acid, in turn, releases iron species (Fe^{2+}, Fe^{3+}), aluminum (Al^{3+}), and other potentially toxic elements into the soil and water systems [6]. Anthropogenic activities such as mining or soil drainage are the primary reasons for ASW; however, there are also rigorously natural occurrences [5]. Usually, ASW is orange-yellow or dark brown with very low pH [2 - 6], high aluminum concentration, and almost contains yellowish jarosite ($KFe_3(SO_4)_2(OH)_6$) mottles in the topsoil (< 1m) [1,4].

According to the Ministry of Agriculture and Rural Development, approximately 18 million people live in the Mekong Delta, of which 13 million people live in sparsely populated rural areas. In recent years, due to abnormal weather changes, large-scale saltwater intrusion, and ASW contamination, about 96,000 households have difficulty drinking water. Surface water is seriously salty, while groundwater is heavily ASW contaminated. People who invest in drilling wells cannot use it. The centralized water supply schemes do not have enough water supply, both surface water and groundwater. On the other hand, most households live in areas far from rural centralized water supply schemes, making it challenging to expand water supply pipes. The lack of clean water for use leads to higher water prices, but people can only sometimes afford it.

Concerning the increasing shortage of fresh water, under the pressure of regional demand and the contribution of ASS dewatering activities to the decrease in safe freshwater supplies, management and treatment efforts to avoid these effects are needed [7]. Several methods have been applied to deal with ASW, like coagulation, adsorption, ion-exchange, filter membrane, and even filter machines, and so on. Nevertheless, due to economic conditions and sparse distribution, it is hard for households to set

up modernized and centralized water treatment systems. Then, simplified methods have been chosen to treat. The most common one is to mix an alkaline material (usually agricultural lime) into the water, where it can react with acidity and neutralize it, leading to the fact that acid sulfate cannot be removed entirely.

This paper aims to evaluate the efficacy of simplified treatment processes (including using burnt lime and aeration). To do this, the simulated ASW was created and then dealt with by these processes. The ASW samples experienced three stages: Using quicklime (CaO) to increase the pH of ASW, and Filtering precipitates with filter papers. The results could help to construct the following stages or be used as a reference for offering alternative methods.

2. Material and method

2.1. Water sample preparing

Typically, ASW has a pH range of 2 - 6, with the most extreme concentration of approximately 2 in ASS areas and the highest concentration of Fe^{2+}, Al^{3+}, Mn^{2+} was 70 mg/L, 3 mg/L, and 5 mg/L, respectively. Therefore, stock solution S1 was created with the highest concentrations based on studies in section 1. The composition of AS contaminated water (1L) includes: 0.35g $FeSO_4.7H_2O$ (1.25 mM); 0.07g $Al_2(SO_4)_3.18H_2O$ (0.11 mM); 0.02g $MnCl_2.4H_2O$ (0.09 mM); 0.4g $CaSO_4.2H_2O$ (10 mM); 0.5g NaCl (5.63 mM) [1,9,10,11]. The pH was regulated by H_2SO_4 and NaOH solutions and measured using Mettler Toledo M200 easy pH meter. Water samples S4, S7, S9, S11, and S13 are prepared based on the dilution of S1 solution 4 times, 7 times, 9 times, 11 times, and 13 times, respectively. All samples exhibited a turbidity level of 300 NTU, indicating the presence of a pseudo-suspended solids mixture consisting of kaolin (250 mg/l) and montmorillonite (250 mg/l). The quicklime (CaO) was bought from a commercial and was used to adjust pH.

2.2. Experiment

The prepared samples are placed under the stirring by Velp FC4S with a speed of 60 rpm, then slowly added CaO until the solutions reach the desired pH (6.0, 6.5, 7.0, 7.5, 8.0). After that, the water samples were filtered precipitates again and adjusted to the desired pH (by CaO). Water samples were allowed to settle for 30 min, and the turbidity of water samples after HACH 2100Q measured the reaction. Definitively, the treated ASW was sent to analyze the residual contents of the processed ions by ICP -AES at the Research Centre for Environmental Monitoring and Modeling.

3. Results and discussio

3.1. CaO demand

The appropriate amount of CaO used in this study shows in Table 1. It is clear that there is a marked difference between stock solution and diluted solutions in CaO demand (up to 237.30 mg to raise the S1's pH and only smaller than 12.74 mg for S13). In addition, there is a similar change in the tendency to use less CaO as the AS concentration decreases gradually.

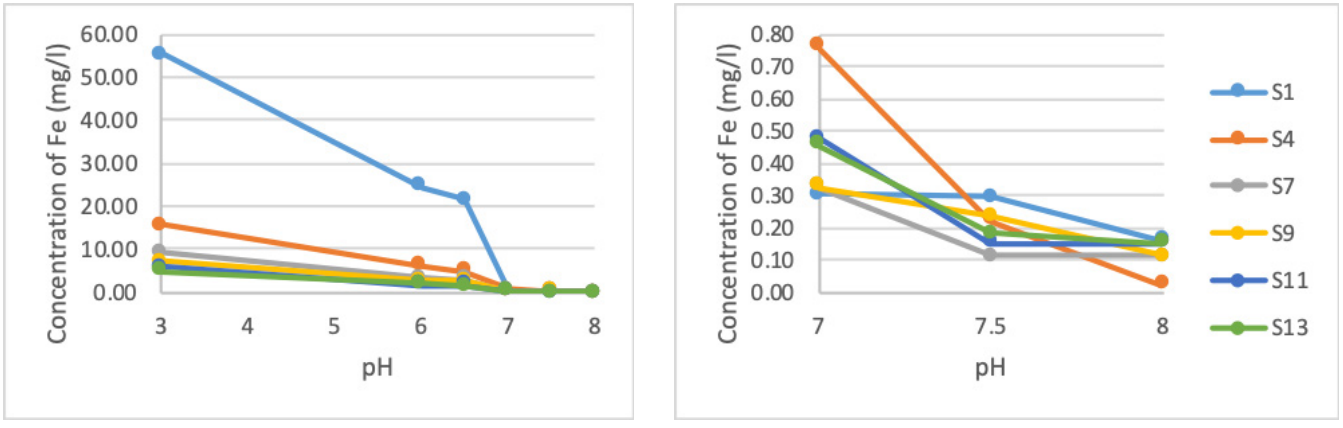
Table 1. Amount of CaO needed to raise the pH of ASW to different pH values (unit: milligram)

Samples	pH = 6	pH = 6.5	pH = 7	pH = 7.5	pH = 8
S1	146.44	147.84	209.86	237.16	267.30
S4	28.56	32.90	41.54	49.46	58.30
S7	17.22	21.98	26.18	30.42	39.96
S9	11.20	14.14	17.64	20.16	22.40
S11	3.22	3.78	12.04	15.40	19.60
S13	4.20	4.48	10.64	11.34	12.74

Moreover, two discernible differences existed between the stock solution and its dilutions. The areas around ASW contaminant sources, which had extremely low pH (2 - 3), needed nearly 600 mg CaO per liter of ASW to increase to 6 or 6.5 and perhaps almost a half more if it grows to 7.5 or 8. Besides, the demand for most of ASW, which had higher pH (2.8 - 4.6) [1], was remarkably lower, only approximately 120 mg per liter of contaminated water at most (to 6 and 6.5) and closely 600 mg per liter of water (to 7.5 and 8). Generally, the results showed an increase in the burnt lime exigency to drop pH from 6 up to 8.

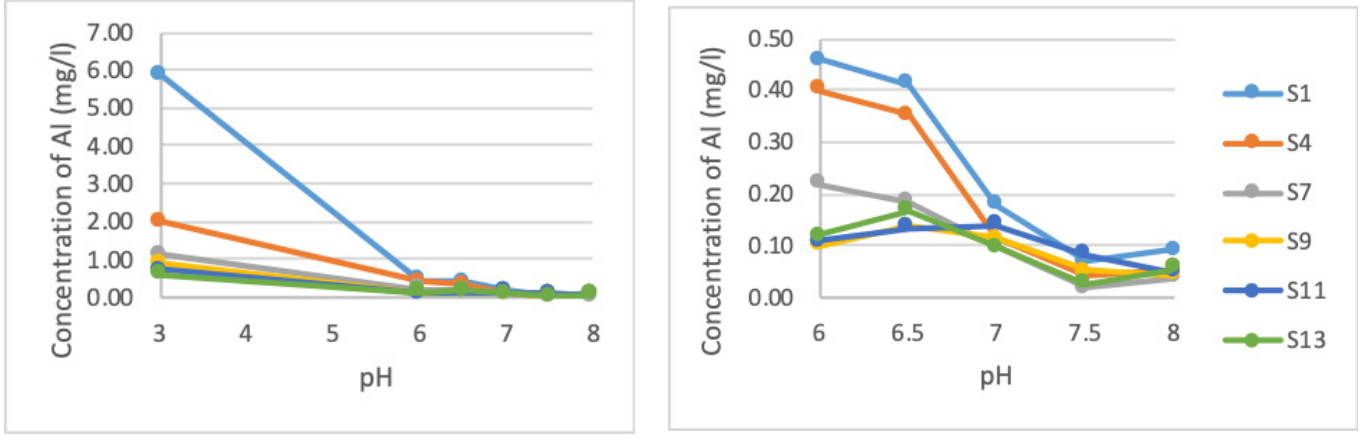
3.2. Fe^{2+} and Al^{3+} removal efficiency

- Fe^{2+} removal.



▲ *Figure 1. The concentration of Fe after treatment at different pH values*

- Al^{3+} removal.



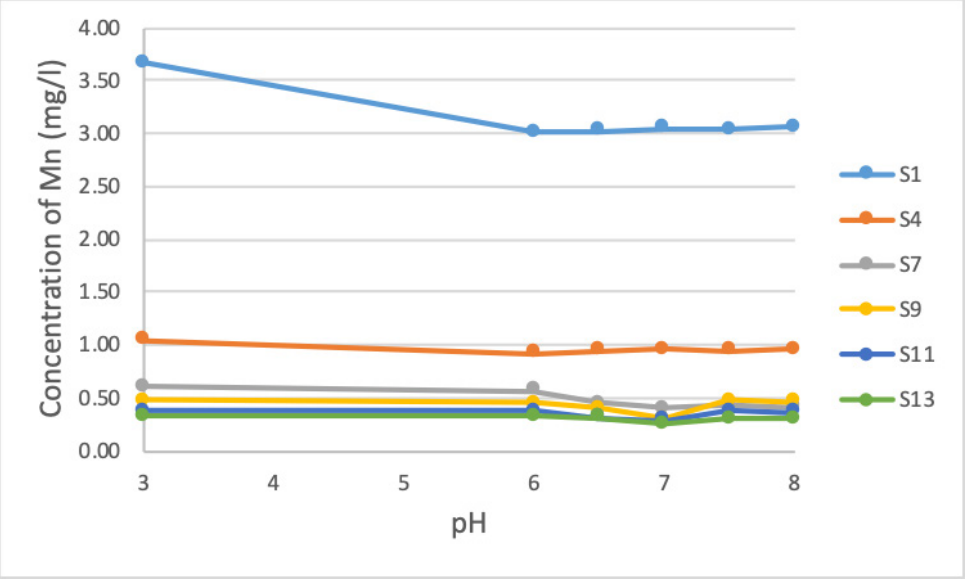
▲ *Figure 2. The concentration of Al after treatment at different pH values*

Figure 1 shows that the concentration of iron at pH 6.0 decreased by about 55 - 65%. The samples showed that the rejection rates were similar. When raising the pH to 6.5, the Fe removal rate does not change much. The concentration of iron in the sample after the reaction decreases by about 10% compared to pH 6.0. However, when the pH rises to 7.0, the concentration of iron rapidly decreases. More than 90% of iron is initially removed at this pH, the iron content ranges from 0.33 - 0.76 mg/l. However, this content still exceeds QCVN 01-1: 2018/BYT (0.3 mg/l). Fe concentration continues to decrease when pH increases above 7. At pH 7.5, Fe content begins to reach the permissible standard in all cases. Initial concentration also greatly influences on Fe treatment efficiency at low pH. At pH 6 and 6.5, Fe concentrations differ greatly between high initial pollution samples and others. From pH 7.0 and above, Fe content did not vary considerably between samples.

Figure 2 shows that with the Al content at pH 6.0, about 90% Al was removed in all samples. However, in the pH range from 6 - 6.5, the two samples with the largest pollutant content, S1 and S4, still have Al content above the allowable standard (QCVN 01-1: 2018/BYT, allowed concentration of Al is 0.2 mg/l). The samples showed that, at pH greater than 7.0, Al concentration at this point met the standard. Samples with high Al concentration S1 and S4 showed a clear difference in Al concentration after treatment compared with the rest. Samples S7, S9, S11 and S13 almost met the permissible standard after raising the pH to 6 and the Al concentration in these samples did not have a clear difference.

3.3. Mn^{2+} removal efficiency

Figure 3 shows that the Manganese content in sample S1 decreased by about 18% after raising the pH to 6.0 with sample S1. However, when the pH was continuously raised above 6.0, there was no change in concentration. Similar to sample S4, the Manganese content decreased by 12% immediately after increasing the pH to 6.0. However, after that, the Manganese concentration did not change. For samples S7, S9, S11 and S13, the Manganese content does not change much when pH rises. Theoretically, Manganese (II) begins to precip-



▲ *Figure 3. The concentration of Mn after treatment at different pH values*

itate a pH of 8.5; however, with samples S1 and S4, due to the large initial Fe content of these two samples, there is a co-precipitation reaction of Manganese with Fe, which makes Manganese decrease when pH increases to 6.0 slightly. However, after that, due to a large amount of Fe precipitated, the removal of Manganese could not continue.

3.4. SO_4^{2-} removal efficiency

All samples show that sulfate was removed a pH of 6.0. It tended to increase slightly when the pH was raised from 90% to 91%. However, the amount of sulfate remaining in the water was still slightly higher than QCVN 01:2009/BYT (QCVN 01-1:2018/BYT does not specify sulfate concentrations).

4. Conclusions

A pH of 7.0, most Al and Fe were removed as over 90% of Al, Fe and sulfate could be eliminated from the solution. When increasing the pH, the concentration of Fe and Al started to dissolve, decreasing efficiency. However, a pH of 7.5, the concentration of Fe and Al just met the permitted standards. At any values of pH, a small amount of Mn was hydrolysed, which means after treatment, Mn was hardly removed from the solution. The result indicated that although traditional methods can treat Al and Fe, it is necessary for the water to have further treatment as the methods cannot eliminate Mn and sulfate completely and they also need advanced treatment.

Acknowledgements: *The research funding from an independent project, code ĐĐL.CN-50/18 was acknowledged* ▪

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The Draft Law on Land (amended) and new points

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The Draft Law on Land (amended) includes several new provisions to institutionalize the orientations presented in the Document of the 13th Party Congress, resolutions, and conclusions of the Party and the National Assembly. It aims to address practical issues and align with development trends.

The need for the amendment of the Law on Land

Land is a precious and finite resource that plays a significant role in the country's development. Strengthening land management and enhancing the effectiveness and efficiency of land use are crucial policies directed by the Party and State leaders. Over the past ten years of implementing the 2013 Law on Land, important achievements have been made, creating a solid legal framework for efficient land exploitation and use in socio-economic development and driving urban growth. However, there have been shortcomings and limitations in the implementation of the Law on Land 2013. Sector-specific master plans have not been consistent and harmonized with the overall land use master plan, lacking a long-term vision and integration of economic development, social problem-solving, and environmental protection. Land resources have not been fully optimized as a vital internal resource for socio-economic development. Wasteful and inefficient land use, project delays, abandonment of agricultural land, and various violations of land legislation have complicated matters. Degradation, pollution, and landslides have also become increasingly serious. These shortcomings and limitations are attributed to the lack of uniformity in the legal system, which does not align with the socialist-oriented market economy and the country's development requirements. Furthermore, the existing land use master plans and related plans have not achieved sufficient consistency and coherence.

Therefore, the revision of the Law on Land is necessary to address these shortcomings and limitations, promote land resources, and meet the country's development requirements in line with the resolutions of the 13th National Party Congress and Resolution No. 18-NQ/TW of the 13th Central Committee. The revision aims to renovate and perfect institutional regimes and policies, enhance the effectiveness and efficiency of land management and use, and create driving forces for transforming the country into a high-income developed nation.

New contents of the Draft Law on Land (amended)

As assigned by the Prime Minister, the Ministry of Natural Resources and Environment (MONRE) has led and coordinated with relevant agencies in developing the Draft Law on Land (amended). The Draft is developed in accordance with the viewpoints of the 13th National Party Congress, Resolution No. 18-NQ/TW, and other relevant resolutions and conclusions. Its purpose is to fully and promptly institutionalize the Party's views and policies on land management and use, amend and supplement provisions, and overcome shortcomings and limitations in the implementation of the 2013 Law on Land.

The Draft Law consists of 16 chapters and 236 articles, with 28 articles remaining unchanged, 184 articles amended, 41 new articles added, and 8 articles abolished. It fully institutionalizes the orientations of the 13th Party Congress, resolutions, and conclusions of the Party and the National Assembly. Notably, it incorporates three general goals, six specific objectives, six groups of solutions, and eight groups of major policies outlined in Resolution No. 18-NQ/TW of the Central Committee. Moreover, it addresses practical problems and aligns with development trends. The Draft Law introduces several new contents, including:

1. Innovating and improving the quality of land use master plans and plans: National and sector-specific master plans, along with land use plans, must be consistent, unified, synchronous, closely linked, and mutually reinforcing for development. They should meet the requirements of rapid and sustainable socio-economic development, national defense and security, environmental protection, and climate change adaptation. The content of these plans defines land use zoning and arrangement in three areas, including strictly managed areas, restricted areas, and areas where land use purposes are changed. The plans also prescribe the combination of land use norms with land use space and determine the location, boundaries, and area of land to be recovered or changed in district-level land use master plans.

2. Completing regulations on land allocation, land lease, and land use purpose change: Land allocation and lease should primarily be conducted through the auction of land use rights and bidding for projects that require land. Cases where land allocation or lease can occur without an auction or bidding process should be strictly defined.

The form of land lease with annual payments should be implemented as the standard, while land lease with one-time payments should be specified based on the nature and purpose of land use. Conditions for land allocation, lease, and land use limits for religious organizations should be prescribed in accordance with the available land resources of the locality. Religious organizations that use land for purposes other than religious activities should pay land rentals to the State as required by Law.

3. Providing more specific guidelines on the authority, purpose, and scope of land recovery, as well as the specific conditions and criteria for land recovery to promote socio-economic development in the best interests of the nation and the public. Develop comprehensive regulations pertaining to compensation, support, resettlement, and land recovery for defense and security purposes, as well as socio-economic development in line with national and public interests. Ensure that compensation, support, and resettlement efforts surpass expectations by prioritizing transparency, publicity, and the harmonization of interests among the State, affected landowners, and investors. This will guarantee that individuals whose land is being recovered are provided with suitable housing options and an equal or improved quality of life. Additionally, specify effective methods for utilizing adjacent land resources to foster socio-economic development, including mechanisms for contributing land use rights, land adjustment, and the enhancement of urban and rural residential areas.

4. Establishing a comprehensive mechanism for determining land prices based on market principles, along with effective mechanisms for inspection and supervision by the Central Government and the People's Council during the development of land price tables. Furthermore, enhance regulations to ensure transparency and public awareness, such as the public disclosure of land prices and facilitating trading through dedicated platforms for residential, urban, and commercial housing projects.

5. Establishing financial mechanisms and policies for land to ensure a harmonious balance between the interests of the State, land users, and investors. This includes regulating revenue sharing mechanisms for land use fees and land rentals between the Central and local governments and setting higher tax rates for users of large land areas, multiple houses, land speculation, slow land use, and abandoned land. Appropriate institutional regimes and preferential policies, such as exemptions and reductions of land use fees and rentals, should be implemented based on eligible investment incentive areas and policy beneficiaries.

6. Completing legal regulations related to the real estate market, including the land use right market. Promoting the commercialization of land use rights, developing a real estate market information system integrated with land information, and encouraging the development of the land use right market, especially the agricultural land rental market. Establishing comprehensive regulations to ensure the healthy, safe, and sustainable development of the real estate market, including compulsory registration of land use rights and land changes, along with specific and synchronized sanctions to prevent unregistered transactions.

7. Strengthening agricultural land management and use by expanding the subjects and limits for receiving the transfer of agricultural land use rights and regulations for converting agricultural land for other purposes in line with crop and livestock production. Enhancing soil quality management and overcoming soil degradation. Prescribing banks leasing agricultural land and promoting effective management and use of agricultural and forestry land, as well as the settlement of residential and production land for ethnic minorities.

8. Prescribing land management and use in combination with multi-purposes, such as combining residential land with trade and services, agricultural land with trade and services, land for national defense and security with economic activities, land for tourism projects with spiritual elements, and land for the construction of aerial and underground works and land formed through sea reclamation activities.

9. Promoting administrative reform and digital transformation in land management and use. Ensuring centralized and unified management, operation, connection, and sharing of information from central to local levels. Simultaneously, continuing to promote decentralization and empowerment alongside effective supervision and control measures.

10. Innovating and strengthening inspection, investigation, supervision, and enforcement measures to handle violations, settle disputes, complaints, and denunciations related to land issues.

The Draft Law on Land (amended) is an important and complex law that plays a fundamental role in the land legal system, influencing the implementation of policies and regulations in other laws. It affects various aspects of socio-economic life and all classes of people. To ensure the Draft Law meets practical requirements, solves local problems, and includes far-sighted regulations and policies with long-term vitality and feasibility, it is crucial to involve experts, scientists, and the public in its development. This participation and contribution will create unity and consensus among the people regarding the Party's guidelines, the State's policies and laws related to land ▪

Current land policies and Law on Management and Use of Forestry Land: Orientation for modification and supplement

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INTRODUCTION

According to land statistics, as of December 31st, 2021, forestry land has an area of 15,439,656 ha, accounting for 46.6% of the total natural area of the country (33,134,480 ha), accounting for 55.15% of agricultural land. In recent years, with the increasingly comprehensive and complete regulations of the Law on Land, forestry and other related laws, the management and use of forest land has brought higher economic, social and environmental efficiency; forest land areas with forests are protected and developed; the allocation of land and forests as well as the management, use and protection of forest land have been gradually stabilized; along with that, the settlement of disputes related to forestry land by competent state agencies has achieved high efficiency, ensuring the interests of forest land users.

The current law stipulates quite comprehensively and fully the contents related to the management and use of forestry land in general and forestland with forests. Legal regulations have basically ensured strict protection for land with natural forests, especially protection forest land and special-use forest land; at the same time, encouraging the development of forest land with forests, creating favorable conditions for subjects to exploit the potential and advantages of forestry land to increase income, develop the economy and ensure the interests of the State. However, reality shows that there are still shortcomings, limitations and inadequacies in policies and laws on management and use of forest land, so the efficiency of forest land use is still limited and not commensurate with potential.

To overcome these shortcomings and limitations, it is necessary to have comprehensive solutions, in which it is necessary to summarize and evaluate the strengths and weaknesses of current policies and laws on management and use of land; thereby, proposing solutions, reviewing and perfecting land policies and laws on the management and use of forestry land, contributing to the protection and development of forested forest land, and at the same time, exploiting and using effectively sustainable forestry land, ensuring adaptation to climate change which is taking place complex and unpredictable.

I. CURRENT POLICIES AND LAW ON FOREST LAND MANAGEMENT AND USE

1.1. Policies and the Law on Land

1.1.1. Land use regimes

The Law on Land 2013 stipulates the use regime for each type of production forest land, protection forest land, and special-use forest land in Articles 135, 136 and 137. These include policies that ensure both forest protection and development, while ensuring income and economic development of people.

For production forest land: The State allocates natural production forest land to forest management organizations to manage, protect and develop forest; The State allocates planted production forest land to households and individuals directly engaged in agricultural production according to the quota, if the limit is exceeded, they have to rent the land; The State may lease planted production forests land to economic organizations, households, individuals, overseas Vietnamese and foreign-invested enterprises to implement investment projects on afforestation; Economic organizations, households, individuals, overseas Vietnamese, foreign-invested enterprises that are allocated or leased by the State with planted production forest land may use such land areas for afforestation or perennial tree planting.

For protection forest land: The State allocates protection forest land to protection forest management organizations for management, protection, zoning, regeneration and afforestation according to master plans and plans. Organizations, households and individuals that have the need and ability to protect and develop forests that are living in protection forest areas without a management organization and in areas planned for afforestation shall be entitled to be granted permission by the State Government to use protection forest land for forest protection and development and may combine the use of land for other purposes in accordance with the Law on Forest Protection and Development. Population communities are allocated forest land for protection by the State for forest protection and development.

For special-use forest land: The State allocates special-use forest land to special-use forest management organizations for management and protection

according to master plans and plans; Special-use forest management organizations shall assign short-term contracts of special-use forest land in strictly protected subzones to households and individuals who have not yet had the conditions to move out of that area to protect forests; Provincial-level People's Committees shall decide to lease special-use forest land to economic organizations in areas associated with landscape business, eco-environmental tourism under the forest canopy.

1.1.2. Authority to change the purpose of land use or forest use to another purpose

To protect forest land, especially special-use forest land and protection forest land, the current Land Law stipulates: In case of changing use purpose of special-use forest land or protection forest land from 20 hectares or more, it shall be under the authority of the Prime Minister and in case less than 20 hectares, it shall be under the jurisdiction of the Provincial People's Council.

1.1.3. Rent forest land

To effectively exploit and use forest land, while ensuring the protection and development of forest land, socio-economic development, income increase, and improvement of life of forest land users and managers, the Land Law stipulates the lease of forest land as followings:

- For special-use forests, the Land Law stipulates: "The People's Committees of provinces decides to lease land with special-use forests to economic organizations in areas associated with landscape business and eco-environmental tourism under the forest's canopy" (Clause 5, Article 137).

- For protection forests, the Land Law stipulates: Provincial-level People's Committees decide to lease protection forest land to economic organizations in areas associated with landscape business, eco-tourism - environment under the forest's canopy (Clause 4, Article 136).

- For production forests, Clause 2, Article 135 of the Land Law stipulates:

+ The State allocates land to households and individuals directly engaged in agricultural production according to the quotas for use for forestry production purposes. For areas of production forest land used by households or individuals in excess of the quota, they must be converted to land lease.

+ The State may lease land to economic organizations, households, individuals, overseas Vietnamese and foreign-invested enterprises to implement investment projects on afforestation.

+ Economic organizations, households, individuals, overseas Vietnamese, foreign-invested enterprises that are allocated or leased land by the State for production forests may use such land area for afforestation or perennial tree planting.

1.1.4. Using land owned by agricultural and forestry companies

In order to improve the efficiency of land management and use by agricultural and forestry companies, Decree No. 43/2014/ND-CP dated May 15th, 2014 of the Government detailing the implementation of a number of articles of the Law on Land is assigned to the Provincial People's Committee to consider and approve the land use plan of the local agriculture and forestry company; decide on land revocation for the area handed over to the locality according to the approved land use plan in order to manage and use the land of the agricultural and forestry companies after these companies has been rearranged, renewed and developed and improved operational efficiency (Article 46 of Decree No. 43/2014/ND-CP).

For the land fund handed over to the locality, the Provincial People's Committee prepares the usage plan. One of the prioritized options to use the area handed over to the locality is to allocate or lease land to households and individuals in the locality who have no land or lack production land to ensure income, stabilize the lives of local people, contribute to socio-economic development.

In order to improve the efficiency on using land of agricultural and forestry companies, the Ministry of Natural Resources and Environment (MONRE) has issued Circular No. 07/2015/TT-BTNMT dated February 26th, 2015 stipulating the contents in the management of land use in general and forestry land in general of agricultural and forestry companies, including: Making land use plans; make records of land use boundaries; cadastral surveying and mapping; determine the land rental price; land allocation, land lease and issuance of certificates of land use rights, ownership of houses and other land-attached assets.

1.2. Other policies and laws related to forest land

1.2.1. Directive No. 13-CT/TW dated January 12th, 2017, of the Secretariat on strengthening the leadership of the Party in forest management, protection and development

To quickly overcome limitations and weaknesses in forest management, protection and development in the period before 2017, on January 12th, 2017, the 12th Party Central Committee Secretariat issued the Directive No. 13-CT/TW aims to strengthen the management, protection and development of forests in the spirit of the Resolution of the 12th Party Congress. In particular, the Secretariat of the Party Central Committee requested all levels of the Party Committees, the Party organizations, authorities, the Fatherland Front, socio-political organizations and people's unions to thoroughly grasp and

effectively implement the tasks and solutions, including the tasks and solutions related to the management and use of forest land as follows:

- Reviewing, supplementing and perfecting the legal system, mechanisms and policies on forest management, protection and development, overcoming overlaps, ensuring uniformity, efficiency and feasibility.

- Review, evaluate and strictly control socio-economic development plannings and projects that have negative impacts on forest area and quality, especially for natural forests and protection forests; have a mechanism for strict management and supervision of projects on conversion of forest use purposes, especially projects on hydropower development, mineral exploitation, construction of industrial parks and tourism services... Review and re-evaluate the implementation results and economic, social and environmental effectiveness of natural forest improvement projects; projects to convert forests to rubber plantations and agricultural production.

- Suspend and recover land for projects on changing forest use purposes that commit violations or are likely to cause great damage to the forest, ecological environment and seriously affect production activities and local people's life in the project area; at the same time, strictly, openly and transparently handle violations and irresponsible organizations and individuals in investment appraisal, approval and licensing.

- Speeding up the progress of survey, measurement, development of management records, delineate and mark the boundaries of forest types on the map and in the field to administrative units of communes, wards and townships, national forest boundaries and boundaries of forest management by forest owners. Overcome and completely settle disputes and illegal encroachment on forest land; complete the allocation of land, forest and grant certificates of forest land use rights to organizations, individuals, households and communities.

- To step up the plantation of mangroves, coastal protection forests, riverside and watershed forests... Strict protection and management, combined with strengthening measures to plant new, restore and regenerate natural forests; develop a mechanism to closely manage and supervise the conversion of protection forests in less critical areas to production forests.

1.2.2. The Law on Forestry

Inheriting the Law on Forest Protection and Development (2004) and at the same time, institutionalizing Directive No. 13-CT/TW of the 12th Party Central Committee Secretariat, the Resolution of the 12th Party Congress on public Forest management, protection and development, the Government submitted to the fourth session of the 14th National Assembly to pass the Law on Forestry on November 15th, 2017. The Law on Forestry (2017) includes 12 chapters with 108 articles that regulate forestry planning; forest management; forest protection; forest use; processing and trading of forest products; rights and obligations of forest owners; forest valuation, investment and finance in forestry; science and technology, international cooperation in forestry; State management of forestry and rangers.

(1) Regarding forest planning

Clause 1, Article 11 of the Law on Forestry stipulates that the national forestry planning is 10 years with 30 - 50 years vision; including orientations for sustainable development of special-use forests, protection forests and production forests at the national level.

(2) Regarding forest allocation and forest leasing

- Article 16 of the Law on Forestry stipulates:

+ The State allocates natural production forests to households, individuals and communities.

+ The State allocates special-use forests without collection of forest use fees to subjects who are special-use forest management boards; organizing science and technology, training and vocational education in forestry; residential community; economic organizations, armed forces... (Clause 1, Article 16).

+ The State allocates protection forests without collection of forest use fees to protection forest management boards, economic organizations, households, individuals, and resident communities; in which, for economic organizations that are assigned protection forests without fee in case protection forests are interspersed in their production forest land (Clause 2, Article 16).

+ The State allocates production forests without collection of forest use fee to the following entities (as defined in Clause 3, Article 16), including: (a) Households, individuals and communities lawfully residing in the area; commune level where the forest area is located; armed forces; (b) The special-use forest management board, the protection forest management board for the area of production forest interspersed with the area of special-use forest or protection forest shall be assigned to such forest management board.

- Article 17 of the Law on Forestry stipulates that the State allows economic organizations, households and individuals to lease natural production forests and planted production forests (with one-time or annual rental payment) to: Forestry production; Combined forestry, agriculture and fishery production; Business eco-tourism, resort, entertainment.

- Forest owners self-organize, cooperate, associate or lease the forest environment to organizations or individuals for eco-tourism, resort and entertainment business in the for-

est, ensuring that it does not affect the conservation of natural ecosystem, biodiversity, landscape, environment and other functions of the forest (Clause 4, Article 56).

(3) About change the purpose of forest use

- Article 20 of the Law on Forestry stipulates the authority to decide on the policy of changing the forest use purpose to another purpose:

1. The National Assembly shall decide on the policy of changing the intended use of special-use forests, watershed protection forests and border protection forests of 50 hectares or more; protection forest against wind, flying sand and protection forest against waves and sea encroachment of 500 ha or more; production forests of 1,000 hectares or more.

2. The Prime Minister shall decide on the policy of changing the intended use of special-use forests of less than 50 hectares; watershed protection forest, border protection forest from 20 ha to less than 50 ha; protection forests against wind, flying sand and protection forests against waves and sea encroachment from 20 ha to less than 500 ha; production forest from 50 ha to less than 1,000 ha.

3. Provincial-level People's Councils shall decide on the policy of changing the intended use of watershed protection forests, border protection forests, windbreak and flying sand protection forests and protection forests for breaking waves and encroaching on the sea of less than 20 hectares; production forest under 50 ha; forests protect the water source of the community.

Article 14 of the Law on Forestry stipulates: "Do not change the purpose of using natural forests to other purposes, except for projects of national importance; projects serving national defense and security; other urgent projects approved by the Government" (Clause 2).

(4) Regarding forest revocation

Clause 1, Article 22 of the Law on Forestry stipulates that the State shall revoke forests in the following cases:

- Forest owners use forests for improper purposes, intentionally fail to fulfill their obligations to the State or seriously violate regulations of the Law on Forestry.

- Forest owners fail to conduct forest protection and development activities after 12 consecutive months from the date of being assigned or leased forests...".

II. SHORTCOMINGS IN POLICIES AND LAW ON FOREST AND FOREST LAND USE AND MANAGEMENT

Forest land and forests have a close relationship with each other; forests are resources and assets attached to forest land but are regulated by two different laws (the Land Law and the Law on Forestry). Practice shows that, although the Law on Land and Forestry has made strong changes, it has a positive impact on the management, protection and development of forests; However, there are still some difficulties, obstacles and inadequacies in the mechanisms and policies for the management and use of land and forests in the current law on land and forestry.

2.1. Regarding land and forest allocation

- In Clause 1, Article 135, the Land Law (2013) stipulates: "The State allocates natural production forest land to forest management organizations for forest management, protection and development". Meanwhile, in Article 16 of the Law on Forestry, the State only allocates natural production forests to households, individuals and communities (there is no consensus on the regulations on subjects in the two laws: forest management organizations vs. households, individuals, communities).

- Clause 3, Article 136 of the Land Law (2013) stipulates that the State allocates protection forests to organizations and individuals. According to the provisions of Point b, Clause 2, Article 16 and Clause 4, Article 56 of the Law on Forestry, the State shall only assign protection forests to economic organizations in cases where protection forests are interspersed in their production forest land. Meanwhile, for other cases, only the form of forest environment lease for protection forest shall be applied.

- Clause 1, Article 137 of the Land Law (2013) stipulates: "The State allocates special - use forest land to special-use forest management organizations for management and protection according to land use planning...". However, in Clause 1, Article 16 of the Law on Forestry, special-use forests are allocated without collection of forest use fees to entities such as special-use forest management boards, economic organizations, armed forces…

2.2. About land lease, forest lease

- For special-use forests, Clause 5, Article 137 of the Land Law (2013) stipulates: "5. Provincial-level People's Committees shall decide to lease special-use forest land to economic organizations in areas associated with landscape business, eco-environmental tourism under the forest canopy".

Meanwhile, in Article 17 of the Law on Forestry, there is no provision for economic organizations to lease special-use forests, economic organizations can only sign special-use forest environment lease contracts with the Special-use Forest Management Board for ecotourism business; resort, entertainment except strictly protected zones (Clause d, Article 75 of the Law on Forestry).

- *For protection forests,* Clause 4, Article 136 of the Land Law stipulates: "4. Provincial-level People's Committees shall decide to lease land for economic organizations to protection forests in areas that are combined with landscape and eco-environmental tourism under the forest canopy".

Meanwhile, in Article 17 of the Law on Forestry, there is no provision for economic organizations to lease protected forests. Economic organizations can only sign a contract to lease a protected forest environment with the Protection Forest Management Board for tourism business, eco-tourism, convalescence and entertainment (Clause b, Article 76 of the Law on Forestry).

- For production forests, in Clause 2, Article 135 of the Land Law stipulates the objects that are allocated or leased land by the State are planted forests, of which the State leases land to economic organizations, households, individuals, overseas Vietnamese, foreign-invested enterprises to implement investment projects on afforestation; and at the same time use unforested land for afforestation or perennial crops.

Meanwhile, Article 17 of the Law on Forestry does not stipulate that production forests are leased by overseas Vietnamese, only foreign-invested enterprises are leased land by the State to implement investment projects on production forests. Overseas Vietnamese who want to conduct investment projects on afforestation in Việt Nam must register to establish an enterprise to be allocated afforestation land by the State.

2.3. Change of land use purpose, change of forest use purpose to other purposes

Article 58, the Land Law 2013 stipulates the case of changing the intended use of special-use forest land or protection forest land from twenty hectares or more, under the Prime Minister's authority; Provincial-level People's Councils permit the change of intend use of less than 20 hectares of protection forest land and special-use forest land. However, in Clause 2, Article 14 of the Law on Forestry (2017), it is stated: "Do not change the purpose of using natural forests to other purposes, except for important national projects; projects serving national defense and security; or other urgent projects approved by the Government". The Land Law only states that the purpose of using special-use forest land or protection forest land is changed, not distinguishing natural forests from planted forests; meanwhile, the Law on Forestry only regulates natural forests; on the other hand, in the guiding documents for the implementation of the Law on Forestry, there are no specific explanations about "other urgent projects", so it is difficult for the forest management agency to determine which criteria are urgent projects to develop dossiers and submit them to competent authorities for approval to allow the conversion of natural forest use purposes to other purposes.

Clause 3, Article 20 of the 2017 Law on Forestry stipulates that the Provincial People's Councils decide on the policy of changing the use purpose of watershed protection forests, border protection forests, wind and sand protection forests and protection forest to break waves and encroach on the sea under 20 ha; production forest under 50 ha; forests to protect water sources of residential communities; Provincial People's Councils do not have the authority to permit the change of special-use forest use purposes; meanwhile, Clause 3, Article 58 of the 2013 Land Law stipulates that the Provincial People's Councils allow the change of use purpose of less than 20 hectares of protection forest land and special-use forest land.

Thus, with the same content, there is no consensus between the Land Law and the Law on Forestry, making it difficult for relevant agencies to implement.

2.4. About land acquisition, forest revocation

Clause 1, Article 64 of the Land Law prescribes cases of land revocation due to violations of the Land Law, including the following cases: Using land for improper purposes and having been administratively sanctioned and continuing to violate; intentionally destroying land; afforestation land is not used for twenty-four consecutive months…

Clause 1, Article 22 of the Law on Forestry stipulates cases in which the State revokes forests, including: (a) Forest owners use forests for improper purposes, intentionally fail to fulfill obligations to the State or seriously violate regulations provisions of the law on forestry; (b) The forest owner fails to carry out forest protection and development activities after 12 consecutive months from the date of forest allocation or lease…".

However, the Law on Forestry as well as legal documents do not explain the phrase "serious violation of the provisions of the law on forestry"; acts, nature, extent and consequences shall be considered as serious violations to serve as a basis for forest revocation.

Practice shows that, in many localities, there are many cases of violations of the law on forestry, such as encroaching and occupying forests; violating regulations on forest use purpose change; illegal forest exploitation; illegal destruction of forests... The nature, extent and consequences of the violation to the extent that the forest must be revoked, but the forest owner did not violate the law on land, so the land cannot be revoked, therefore, forest revoked is not feasible; This is a problem and inadequacy between the Land Law and the Law on Forestry, making it difficult for the authorities to enforce the Law.

2.5. Procedures for changing land use purpose and forest use purpose

Currently, in order to implement a project with an area of forest land that needs to be repurposed, in the case that it requires permission from a competent state agency, the investor must carry out two independent processes, one is submitting self-procedure for

change of land use purpose (led by the MONRE in accordance with the Land Law) the village in accordance with the provisions of the Law on Forestry. Thus, increasing administrative procedures, increasing costs, prolonging project preparation time, slowing down the project implementation schedule, affecting the investment efficiency of the project.

III. RECOMMENDATIONS TO IMPROVE POLICIES AND LAW ON FOREST LAND USE AND MANAGEMENT

Although the Law on Land and Forestry has made strong changes, it has had a positive impact on forest management, protection and development. However, there are still some difficulties, obstacles and inadequacies in the mechanisms and policies on management and use of land and forests in the current laws. To overcome this situation, it is proposed to review, amend, supplement and complete the Law related to mechanisms and policies on management and use of land and forests in the following directions:

For production forests: It is necessary to clearly define the subjects who are allocated land, leased land, recognized the right to use; allocation of production forest land without land use levy; lease production forest land for forestry production; stipulating the rights of individuals to be allocated land by the State without collection of land use levy or leased land with annual payment for natural production forests; the use in combination with other purposes of economic organizations, households and individuals leased land by the State.

For protection forest land: It is necessary to specify who is allocated protection forest land for forest management in accordance with master plans and plans on land use approved by competent state agencies; prescribe the use in combination with the purpose of growing annual crops, medicinal plants, animal husbandry; eco-tourism, convalescence and entertainment; allowed to build infrastructure works in service of forest protection and development and fulfill financial obligations.

For special-use forest land: It is necessary to specify the objects that are allocated special-use forest land by the State for forest management in accordance with land use master plans and plans; stipulate the formulation of migration and resettlement projects and submit them to competent state agencies for approval to move people out of strictly protected sub-zones of special-use forests; stipulating the use in combination with the purposes of ecotourism, convalescence and entertainment; may build infrastructure works in service of forest protection and development and fulfill financial obligations.

For land originating from agricultural and forestry farms: It is necessary to clearly define the responsibilities of agro-forestry companies that are managing and using land originating from agricultural and forestry farms; responsibility of the People's Committee of the province for the area of land originating from agricultural and forestry farms and handed over to the locality and for the land area belong to that the land-using organization has dissolved.

Supplementing regulations on multi-purpose use of forestry land: In order to improve the efficiency of land use, implement the Party's policy in Resolution No. 18-NQ/TW dated June 16th, 2022 of the Central Executive Committee 13th Party Central Committee (on continuing to renovate, perfecting institutions and policies, improving the effectiveness and efficiency of land management and use, creating motivation to turn our country into a developed and high-income country), it is necessary to study and develop an article on multi-purpose land for land plots that are used in combination with two or more purposes. In which, the main land use purpose is determined according to the decision on land allocation, land lease, permission to change land use purpose, recognition of land use rights, in addition, the land parcel also has one or more secondary purpose. According to this regulation, forestry land will be used in combination with commerce, services, animal husbandry, agricultural and forestry production in combination with growing medicinal plants. This will increase income, improve people's living standards, contribute to economic development, political and social stability in forest management and protection areas, especially in natural forest management and protection.

Combine the procedures for change of land use purpose with the order of procedures for change of forest use purpose: Now, the implementation of the sequence of procedures for changing the forest land use purpose and the sequence of procedures for changing the forest use purpose independently, thus it leads to prolonging the project implementation time. To reduce administrative procedures; creating uniformity and consistency in the management of land use and management of forest use; shortening the time to carry out administrative procedures… Accordingly, after the Prime Minister approves the policy of changing the forest land use purpose for the implementation of constructions and projects, the Ministry of Agriculture and Rural Development shall guide the implementation of administrative procedures for conversion of forest use purposes on that area. This will speed up the implementation of constructions and projects, contributing to promoting socio-economic development ■

Planning on water resources from 2021 to 2030, with a vision to 2050

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In accordance with the Prime Minister's Decision 995/QD-TTg dated August 9th, 2018, which assigned Ministries to develop national sector plans for the period 2021 to 2030, with a vision to 2050, the Ministry of Natural Resources and Environment (MONRE) has taken significant measures to direct the formulation of national sector plans in the field of natural resources and environment. As a result, on December 27th, 2022, the Prime Minister issued Decision No. 1622/QD-TTg approving the Master Plan on Water Resources for the period 2021 to 2030 with a vision to 2050. This Plan is the fifth out of thirty-eight national sector plans approved by the Prime Minister. The Master Plan serves as a foundation and guideline for MONRE, related Ministries, departments, and localities to continue developing specialized technical master plans for water exploitation, use, and protection in an economical, efficient, and sustainable manner. Planning plays a crucial role in guiding, regulating, and allocating water resources to meet the objectives of the ten-year socio-economic development strategy (2021 - 2030).

Key contents of the Master Plan

Establishing a foundation for the development of water exploitation and use master plans

Recognizing that water is a vital national resource and a fundamental component of the natural ecosystem, with implications for all economic, social, defence, and security activities of the country, water resources planning must be strategic, ensuring a long-term vision, comprehensive orientation, regulation, and distribution of water resources to meet the objectives of the ten-year socio-economic development strategy (2021 - 2030). The priority should be given to ensuring water supply for daily life, stabilizing social security, eradicating hunger, and reducing poverty, while also aligning with the development requirements of each industry, locality, and community. Water resources planning forms the basis for the formulation of national sectoral master plans on water exploitation and use, as well as regional and provincial planning.

Implementation of the Master Plan covers six socio-economic development regions (Northern Midlands and Mountains, Red River Delta, North Central and Central Coast, Central Highlands, Southeast and Mekong River Delta); 13 major river basins (Bằng Giang - Kỳ Cùng, Hồng - Thái Bình, Mã, Cả, Hương, Vu Gia - Thu Bồn, Trà Khúc, Kôn - Hà Thanh, Ba, Sê San, Sêrêpôk, Đồng Nai, Cửu Long); the group of coastal river basins and some islands within Vietnam's territory. It focuses on managing, utilizing, and developing water resources in a sustainable, integrated, and unified manner based on river basins, inter-regions, and inter-provinces, while adhering to the socialist-oriented market principles. All demands for water use in socio-economic development must be in line with the functions and responsiveness of water sources, aiming for economic, efficient, fair, and reasonable utilization with multiple goals. The Plan also aims to protect the environment, aquatic ecosystems, adapt to climate change, and ensure national water security.

Ensuring national water security

The Plan aims to ensure national water source security, effectively manage, and protect water resources, regulate, and distribute water resources, prevent, combat, and overcome harmful consequences caused by water and strike a balance between the needs of people's livelihoods, socio-economic development, and environmental protection. It aims to minimize damage to people's lives and properties, control the quality and reserve of water sources, improve water storage capacity in river basins, economic zones, and localities, ensure national defense and security and align with the functions and responsiveness of water resources under climate change. The Plan strives for integrated governance of the water sector based on digital technology, managing, and utilizing water resources in a cyclical cycle to ensure efficiency, serve multiple purposes and meet the requirements of rapid and sustainable national development.

Effectively addressing drought

The goal by 2030 is to harmonize and distribute water resources fairly and reasonably among sectors, localities, water exploiters and users based on integrated planning of inter-provincial river basins, ensuring the strategy for economic development and social security. By 2025, there should be integrated planning for inter-provincial river basins in 100% of large and important river basins. Moreover, the Plan aims to increase the rate of using clean water for urban populations to 95% to 100% and provide access to clean water for 65% of the rural population. It also aims to have control over more than 90% of water exploitation and use activities, improve the efficiency and capacity of water exploitation and use, minimize water loss in irrigation systems, and reduce water loss in water supply activities to 10%. Special attention will be given to effectively addressing drought and water shortages in river basins, particularly in regions such as the South-Central region, Central Highlands, Mekong River Delta, remote areas, and islands.

Preventing water pollution

The Master Plan aims to protect, control, prevent, and minimize degradation, depletion, and pollution of water sources. By 2030, the goal is to collect and treat wastewater up to standards and technical regulations before discharging into the environment, reaching 30% of the total wastewater volume in urban centres of grade II and above, and 10% in urban areas from Class V and above. The Plan also aims to improve and restore important degraded, depleted, and polluted water sources, with priority given to river sections flowing through concentrated population areas and water sources that play crucial roles in domestic water supply, domestic activities, and other socio-economic development activities. Socialization efforts will be emphasized, especially for the main streams of the Red River, Cả River, Vu Gia - Thu Bồn River and Ba River. Additionally, the Plan includes the delineation and announcement of restricted areas for underground water exploitation, the preservation of ponds, lakes, and lagoons, prevention and control of subsidence caused by underground water exploitation, the establishment and announcement of corridors to protect water sources, and measures to prevent landslides, bank and riverbank erosion, and other harmful effects caused by water.

Being proactive on water in all situations

The goal is to strive towards raising the national water security index to the level of countries that ensure effective water security in the world by 2050. The objective is to be proactive regarding water resources in all situations, including forecasting and regulating water, preventing floods, droughts, saltwater intrusion, pollution, degradation, water depletion and responding to climate change.

The Master Plan explicitly states the guidelines for managing, regulating, distributing, exploiting, using, protecting water resources, and preventing and controlling the adverse effects caused by water on a national scale. These guidelines are formulated considering socio-economic development regions and river basins.

Deploying six key solutions

To implement the Master Plan on Water Resources for the period 2021 -2030, with a vision to 2050 (the Master Plan), six key solutions have been outlined:

Firstly, in terms of law and policy, the focus is on reviewing, amending, supplementing, and integrating regulations on water management into a comprehensive water law. The aim is to effectively manage, control and regulate water issues based on unified management of water resources. Additionally, efforts will be made to socialize the water sector, involving activities such as basic investigation, investment, construction, and rehabilitation of polluted, degraded, and depleted rivers. This approach ensures a harmonious balance between the interests of the state and enterprises. Other aspects include rainwater collection to combat urban flooding, financial obligations towards organizations and individuals benefiting from activities related to the protection, renovation, and restoration of water sources, and the management of water supply services.

Secondly, there is a focus on renewing and strengthening river basin committees, ensuring they have sufficient authority, resources, and operational efficiency to address inter-regional and inter-sectoral issues related to the exploitation, use and protection of water sources. Mechanisms for coordination and monitoring of water resource exploitation and protection, as well as the prevention of water-related harm and the mitigation of climate change impacts on water security, will be developed and implemented effectively.

Thirdly, increasing the use of economic tools is emphasized for the prevention and treatment of pollution, degradation, and depletion of water sources, as well as the exploitation and use of water resources. The Plan also includes socializing the provision of water services.

In terms of finance, the focus is on increasing investment and effectively utilizing capital from the state budget in accordance with the relevant laws. This includes the Law on the State Budget, the Law on Public Investment, and other supporting laws related to the implementation of the Master Plan. Additionally, efforts will be made to supplement budgetary capital for the protection and restoration of water sources. Incentives will be provided for investment activities in the exploitation and supply of domestic water. Diversification of investment resources related to climate change, which affects water resources, is also encouraged. The Plan aims to strengthen, encourage, and mobilize domestic and foreign resources for socialization in the protection and development of water resources. Scientific and technological development to exploit and use water efficiently and to improve the efficiency of wastewater treatment is also prioritized.

Fourthly, in the areas of science, technology, and international cooperation, the focus is on strengthening research and cooperation, as well as technology transfer. The objective is to develop appropriate measures and solutions for the implementation of tasks related to national water source security. Priority will be given to monitoring, forecasting, and warning activities, as well as the economical and efficient use of water. A database system for water resources, water exploitation and use, wastewater discharge into water sources, weather data, remote sensing data, GIS, satellite image information, and the use of smart technology and artificial intelligence for water resources management will be established. Advanced and modern technology will be applied, and basic investigations will be conducted to ensure the sustainable management of water resources, particularly in border areas, islands, and regions with water scarcity, in combination with protecting national sovereignty.

▲ *The Plan aims to protect the environment, aquatic ecosystems, adapt to climate change and ensure national water security*

Fifthly, awareness-raising efforts will be focused on building and implementing communication programs that cater to different target groups in society. These programs will educate the public about water resources laws in general and the specific solutions related to the regulation, distribution, protection, and development of water resources, as well as the economical and efficient exploitation and use of water. The role of mass media in disseminating information about guidelines, policies, and laws regarding water security will also be promoted.

Sixthly, the Plan emphasizes training and capacity building. This includes reviewing, assessing, and consolidating human resources in water resources management at Central and local levels. Training and retraining plans and programs will be formulated and implemented to meet the requirements for water resources management. Efforts will be made to enhance the professional capacity, professional skills, and management skills of staff engaged in scientific research and water resources management. Remuneration policies will be implemented to attract high-quality human resources to participate in water resources management activities, forming a team of specialists at the Central and local levels.

To ensure effective implementation of the Master Plan, efforts will be made to organize and supervise its execution. This involves expediting the implementation of the Master Plan on Water Resources and the formulation and implementation of river basin master plans. Furthermore, there will be an emphasis on conducting basic surveys of water resources to provide information and data for the formulation and adjustment of water resources planning and the development of water use plans. This proactive approach aims to secure water sources for various sectors and fields. Special attention will be given to investigating and searching for underground water sources, especially deep aquifers, to address daily water supply needs in areas frequently affected by saline intrusion, ethnic minority areas, border areas, islands, regions with water scarcity, and areas with extremely difficult socio-economic conditions.

In conclusion, while the sectors involving the exploitation and use of water have been implementing plans for several years, the Master Plan represents a comprehensive plan implemented for the first time. As a result, the orientations for the management, regulation, distribution, exploitation, use, protection, and control of water resources, as well as the prevention and mitigation of water-related harm, are considered in a holistic manner, taking into account the different river basins nationwide, the current status of water resources, and the demand for water use by industries. Throughout the planning process, the MONRE has closely coordinated with Ministries, branches, and localities to ensure synchronization between the Master Plan and other relevant national sector plans. The Master Plan on Water Resources is linked with other national sectoral master plans that involve the use of water, such as the Master Plan on natural disaster prevention and control, irrigation, national energy, and national electricity development.

Additionally, the planning process includes the master planning for six socio-economic development regions (Northern Midlands and Mountains, Red River Delta, North Central and Central Coast, Central Highlands, South East, Mekong Delta); thirteen major river basins (Bằng Giang - Kỳ Cùng, Hồng - Thái Bình, Mã, Cả, Hương, Vu Gia - Thu Bồn, Trà Khúc, Kôn - Hà Thanh, Ba, Sê San, Sêrêpôk, Đồng Nai, Cửu Long); groups of coastal river basins, and a number of islands within the territory of Việt Nam.

The Master Plan is accompanied by annexes, including: (1) Water resources by regions and river basins; (2) Demand for water; (3) Orientation on management, regulation, distribution, exploitation, use, and protection of water resources, prevention and control of harmful effects caused by water in river basins; (4) Orientation on management, regulation, distribution, exploitation, use, and protection of water resources, prevention and control of harmful effects caused by water according to socio-economic development zones; (5) List of large-scale works for regulation, exploitation, and use of water resources; (6) List of priority tasks, schemes, and projects ▪

Evaluation of the results of 10 years of implementing the Law on Water Resources 2012

MSC. NGUYỄN THỊ PHƯƠNG
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The Law on Water Resources (LWR), which was passed by the National Assembly in 1998, was revised for the first time in 2012 and passed at the 3rd session of the 13th National Assembly on 21st June 2012, officially took effect from 1st January 2013 to present. On the basis of the provisions of the Law, the MONRE has developed and submitted to the Government, the Prime Minister to promulgate or the Ministry to promulgate according to its competence 70 documents to detail, guide the implementation of the Law (14 decrees, 21 decisions of the Prime Minister and 35 circulars); local authorities also issued 445 guiding documents for the implementation of the Law and decrees. After more than 10 years of implementation, the LWR 2012 has developed its effectiveness and efficiency in many aspects, creating a fairly complete and comprehensive legal framework in the management and protection of water resources nationwide. Water resource management has achieved achievements in institutions and policies; management, exploitation and protection of water sources; preventi and overcoming harm caused by water, also generation of revenue for the state budget, contributing to socio-economic development, ensuring security and defense.

Outstanding results

Regarding the basic survey of water resources, in the past time, the MONRE has issued the List of inter-provincial river basins; List of intra-provincial river basins; List of inter-provincial water sources; List of inter-country water sources (surface water sources); 6 local authorities have issued the List of minimum flows in intra-provincial rivers and streams according to their competence. In addition, the Ministry has announced the minimum flows downstream of 642 reservoirs and dams of 582 irrigation and hydroelectric works; the national total inventory of water resources is being carried out according to the Decision No. 1383/QĐ-TTg dated 4th August 2021 of the Prime Minister on approval of the National Scheme for Total Inventory of Water Resources for the period to 2025; the development of the water resource monitoring network is being carried out in accordance with the Master Plan of the national network of natural resources and environment monitoring stations for the period 2016 - 2025, with a vision to 2030. To date, investment has been made in building and putting into operation 23 independent surface water resource stations, 23 hydrological stations integrated surface water resource stations in 11 inter-provincial river basins and a number of other results in the ongoing basic survey of water resources at the Central as well as local levels. In addition, the management and supervision of exploitation and use of water resources has been strengthened and promoted, in which has been building and perfecting an automatic and online monitoring system for decision making and management at Central and local levels. Most water exploitation and use units have installed equipment, surveillance cameras, and transmitted information and data to the monitoring system. This is an important foundation in the digital transformation as well as the operation of the national water resource information and database system.

Regarding planning, 6/15 master plans have been approved by the Prime Minister (Master Plan for water resources; master plan for basic survey of water resources; Master Plan for 4 river basins: Bằng Giang - Kỳ Cùng, Sê San, Sêrêpok, Hồng - Thái Bình), the Master Plan for Cửu Long River Basin is being submitted to the Prime Minister for consideration and approval. It is expected that in the period of 2023 - 2024, 8 master plans for the remaining river basins (Mã River, Cả River, Hương River, Vũ Gia - Thu Bồn River, Trà Khúc River, Côn Rriver, Ba River, Đồng Nai River) will be submitted to the Prime Minister for approval. At the local levels, before the Law on Planning was promulgated in 2018, the whole country had 52/63 provinces and cities directly under the Central Government planning for water resources. After the Law on Planning No. 21/2017/QH14 took effect, local authorities have been developing and integrating the content of water resources in the provincial planning according to regulations.

In addition, the flow protection and water source protection have been decentralized to each local authority and reservoir owner. This policy contributes to the

▲ *The flow protection and water source protection have been decentralized to each local authority*

prevention and control of activities with potential risks of causing pollution, degradation and depletion of water resources; protection of the stability of riverbeds, banks, prevention and control of the encroachment of land near water sources; protection, conservation and development of aquatic ecosystems, natural flora and fauna along water sources, historical, cultural and religious values related to water sources... to protect and maintain water sources. Up to now, 43/63 provinces have approved the List of water sources for which protection corridors must be established; 10/63 provinces are developing the list to submit to the Provincial People's Committee for approval. Most of the hydroelectric reservoirs that are in operation (over 1 million m^3) have been completed and are completing the marking of the corridor. 40/63 provinces and cities have also approved the sanitary protection zones for domestic water use for the projects in the province; 40/63 provinces and cities have approved and announced the list of lakes, ponds and lagoons that cannot be leveled.

The regulation and allocation of water resources with minimum flow requirements to ensure fairness in the exploitation and use of water resources has been gradually improved, significantly contributing to managing and minimizing conflicts from exploitation, use and protection of water sources. The promulgation and implementation of regulations of the Inter-reservoir Operation Procedures on 11 river basins is especially important to ensure the regulation and allocation of water sources as well as the integrated use of water sources and harm prevention caused by water.

Along with that, the organization of zoning and announcement of the list of areas restricted from exploitation of underground water and the implementation of measures to limit the exploitation of underground water according to the provisions of Decree No. 167/2018/NĐ-CP of the Government has also been implemented aggressively across the country. Up to now, 26/63 provinces and cities have issued Decision to announce the List of areas restricted from exploitation of underground water, the remaining provinces are implementing according to the provisions of the Decree.

In addition, in implementing the LWR 2012, the Government has promulgated regulations on calculation methods and fees for granting the right to exploit water resources, ensuring the interests of the State as a representative of the owner of water resources and improving awareness and responsibility of organizations and individuals in the economical and efficient exploitation and use of water, ensuring fairness. According to statistics of the MONRE, as of 31st December 2022, the Ministry has issued nearly 1,500 decisions approving the grant of water resources exploitation rights with a total amount of over 12,000 billion VND, contributing to the state budget nearly 6,300 billion VND. At the local level, the provinces have approved the total amount of money for granting the water resources exploitation and use rights nearly 600 billion VND, of which contributed nearly 300 billion VND to the state budget. On average, the annual revenue from this activity for the state budget is about 1,300 billion VND and is expected to continue to increase due to more water resources exploitation projects coming into operation.

Some shortcomings and limitations

Besides the achieved results, after more than 10 years of implementation, there have been many changes in economic and social relationships; the State promulgated more policies and legislations related to the management, protection, exploitation and use of water resources, so the LWR 2012 revealed a number of shortcomings and limitations: Some provisions of the Law have interference, overlap with other laws leading to difficulty in implementation or waste of resources, it is necessary to amend and supplement to ensure consistency. The responsibility in management of water resources has not been clearly separated from the responsibility in management of water exploitation and use works as well as water-related activities; a number of relevant legal contents are not consistent and synchronous with the LWR, leading to the fact that there are overlapping tasks and inadequacies in implementation coordination among Ministries, sectors and local authorities; the lack of a legal framework for water security in the context that Việt Nam's water resources is facing many challenges, especially the issue of ensuring water security for daily life.

In addition, the Law does not have transparent and clear mechanisms and policies to create favorable conditions and encourage social resources from all economic sectors, socio-political organizations to participate in the implementation of activities within the scope of responsibilities of Ministries, sectors and local authorities such as monitoring water resources; restoring degraded, exhausted and polluted rivers; investing in the water sector... in order to improve efficiency in exploitation, use, protection and development of water sources. There are no specific policies and regulations to fully calculate and evaluate the value of water resources, which leads to uneconomical use of water, loss and waste of water, that destroys the development motivation, fails to call for socialization in the water sector. Some provisions on business conditions are no longer suitable with actual conditions such as provisions on conducting basic survey of water resources and planning on water resources.

On the other hand, the Law lacks provisions on policies on the use and allocation of revenues for the protection of aquatic resources, leading to the failure to promote economic development in regions. Some provisions are no longer appropriate and need to be amended and supplemented, such as the approval of the use of reservoir water surface; artificial addition of groundwater; control activities of digging lakes and ponds to create space to store water (lakes, ponds not on rivers, streams) or artificial channels for water; provisions related to flood prevention in urban areas; digital transformation issues, provisions related to decision support tools for water resource management; specifying specific subjects in the case of exploitation and use of water for fire prevention and fighting, responding to and overcoming pollution incidents, epidemics and other emergencies; cases in which fees must be collected for granting water exploitation rights... In addition, the enforcement of the legislation on water resources in some places is not strict; the work of detecting, preventing and handling violations has not been done well; financial mechanisms, sanctions, control and supervision tools have not been really effective; the mechanism for cooperation and settlement of transboundary water problems has not been synchronized; a number of new contents arise in practice but the legislation has not yet regulated. Along with that, the coordination between levels and sectors is also a big challenge to be solved.

Thus, after more than 10 years of implementation, the LWR 2012 has contributed to creating positive changes in the awareness and actions of the whole society on the protection, exploitation and use of water resources; water resources are managed and used more effectively and sustainably, bringing revenue to the state budget. However, in the context of climate change, the situation is increasingly unpredictable, 60% of the water volume is formed outside the territory, and the quality of water resources declines, posing great challenges to the state management of water resources. Many new guidelines on water resource management, protection, restoration and assurance of national water security have been promulgated such as Resolution No. 24-NQ/TW dated 3rd June 2013 of the 11th Session of the 7th Central Party Committee Meeting, on proactively responding to climate change, strengthening resource management and environmental protection; Resolution No. 39-NQ/TW dated 15th January 2019 of the Politburo on improving the efficiency of management, exploitation, use and promotion of the economy's resources; Conclusion No. 36-KL/TW dated 23rd June 2022 of the Politburo on ensuring water security and safety of dams and reservoirs until 2030, vision to 2045... That fact requires the legislation on water resources and a number of laws related to the management and protection of water resources to be updated, amended and supplemented soon, ensuring consistency and comprehensiveness ▪

Revision of the Law on Water Resources 2022: Ensuring high efficiency, feasibility and practicality

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Over the past time, the Law on Water Resources (LWR) 2012 has contributed to creating positive changes in the awareness and actions of the whole society on the protection, exploitation, and use of water resources effectively and rationally. Water resources are managed and used more sustainably, bringing revenue to the state budget. However, with 63% of water being formed outside the territory of Vietnam and in the current increasingly unusual climate change conditions, the quality of water resources is showing signs of decline, posing great challenges, while several provisions of the LWR 2012 have revealed certain shortcomings and limitations which do not meet practical requirements. Therefore, the key task of state management of water resources in the period of 2022 - 2023 is to develop a Draft LWR (amended) and submit it to the National Assembly for comments and approval in 2023.

Law-making point of view

Firstly, institutionalize the view that water resources are a particularly important and essential resource, a public property owned by the entire people and uniformly managed by the State. Water resources must be the core in planning socio-economic development, population, sectors and fields with water exploitation and use, planning national development strategies; the exploitation and use of water resources must comply with regulations on management and use of public property, water resources must be managed, protected, exploited and used rationally, economically and effectively, meeting immediate as well as long term needs.

Secondly, the provisions of the Law must be consistent with the Constitution, in sync with relevant specialized legislations and international treaties to which Vietnam has signed or acceded; ensure that the provisions are clear, understandable, highly feasible, promote investment, socialize in parallel with strengthening protection of, improving the efficiency of state management of water resources, associated with the requirements of reforming administrative procedures in the direction of simplicity, efficiency and effectiveness.

Thirdly, inherit the provisions of the LWR 2012 that are effective and repeal any existing shortcomings; update, amend and supplement certain existing provisions to be appropriate to the reality and requirements of ensuring water security and protecting water resources in the new situation; legalize several provisions in the documents under the Law that have been effective in practice to increase the legal value of these provisions.

Fourthly, establish a legal framework for national water resource governance based on digital technology and integrate regulations related to water resource management, exploitation, use and supply in the LWR; continue to renovate institutions and policies in the direction of socializing the water sector, encouraging and attracting social resources and economic sectors to improve the effectiveness of the protection and development of water sources and to minimize the damage caused by water, while enhancing the value of water.

Fifthly, ensure national water security, reduce dependence on foreign water sources and the effects of climate change; focus on prevention, control and restoration of degraded, depleted and polluted water sources; separate the integrated and unified management of water resources from the management and operation of water exploitation and use works (irrigation, hydropower, urban and rural water supply, industrial and service water supply, waterway transportation...).

Sixthly, solve practical issues; legalize regulations that have been affirmed to be appropriate; perfect mechanisms and sanctions to prevent and strictly handle violations of policies and legislation on water resources.

Seventhly, develop the water economy, consider water products as essential goods having prices determined and needing to be managed and operated according to the market mechanism regulated by the State. Ensure equity in access to water resources; all people and all water users can access and use water sources for daily life and production at a reasonable cost.

Eighthly, approach the international trend taking into account the characteristics of Viet Nam; Develop a Draft Law that integrates content related, while delegating responsibilities to the Ministries and sectors for management in integrating regulations related to water resources, in charge according to their functions and tasks stipulated in the laws related to water resources such as irrigation, hydropower, water supply, water transportation...

Some new points and directions for drafting the Law

When approved by the National Assembly, the LWR (amended) will improve the coherent and unified legal framework, ensuring openness and transparency to be able to maximize the exploitation of natural resources, rationally allocate and effectively use resources, ensure suitability with the new situation of Viet Nam. It will also enhance the effectiveness of utilization of water resources, aiming to ensure water security. This will be accomplished through the following new points:

1. Supplement provisions to ensure national water security throughout the entire Draft Law, through provisions that ensure water quantity (activities such as basic survey, management of information and databases on water resources; management of water exploitation and use needs; water resources planing; management of regulation and allocation for use various purposes); water quality for different uses (water source functions; water source carrying capacity; ensuring water quality for domestic use); ensuring ecosystems and the environment (minimum flow rates in rivers, river segments, lakes; groundwater extraction thresholds) and minimizing the negative impacts caused by water. In particular, specific provisions regarding water regulation and distribution, especially in drought and water shortage conditions.

2. Supplement provisions to promote socialization in a way that allows businesses to undertake tasks that they are capable of, thereby, reduce the investment resources of the State. The objective is to gradually shift towards a model where the State focuses on policy-making and oversight while businesses are responsible for implementation. Additionally, supplement provisions on resources for water resource protection and development, which clearly stipulate the resources required for activities related to water protection and development; clarify priority activities for socialization policies in the field of water resources protection and development. The perspective is to integrate economic development with reinvestment in water resources protection and development, landscape improvement, and the preservation of ecosystem values related to water.

3. Gradually shift from administrative tool-based management to economic tool-based one through provisions on fees, charges, and water exploitation rights fees, raising awareness of water resource protection, and promoting water conservation by water users. Amend and supplement provisions on water exploitation rights fees to ensure accurate and sufficient valuation of water resources, in this point, the Draft Law proposes the collection of fee for granting water exploitation rights for domestic water and implements a phased approach to fees for agricultural production.

4. Supplement provisions on water management, exploitation and use, in order to control water exploitation and use in accordance with the intended purposes, and the function of water sources, and the capacity of water sources and ensure minimum flow rates in rivers, streams, and groundwater extraction threshold; Provide for monitoring water extraction and use through interconnected, continuous, and automated data transmission, and responsibilities of organizations and individuals in the supervision of exploitation and use of water resources.

5. Supplementing provisions on the prevention and control of the landslides of riverbeds, riverbanks and lakes and provisions on making and publicizing the list of lakes, ponds and lagoons that must not be levelled in order to strengthen the protection of water sources serve the functions of water regulation, flood control, and environmental protection.

6. Provisions on the responsibilities of the Ministry of Natural Resources and Environment, relevant Ministries, sectors and local authorities, organizations and individuals in developing contingency plans, regulation and allocation of water sources in case of drought or water shortage, and implementing water regulation and distribution in such situations.

7. Supplementing provisions to clearly define the responsibilities for managing water sources and the responsibilities for managing water exploitation works at both central and local levels in the entire Draft Law aimed at managing water resources on a digital technology platform, unifying databases, forming a set of tools to support real-time decision making, minimizing the human resources required for management and operation, and reducing the investment costs of the State.

The Draft Law is developed in the direction of separating the integrated and unified management of water resources from the management and operation of water exploitation and use works (irrigation, hydropower, urban and rural water supply, service and industrial water supply, waterway transportation...). It also aims to address overlapping, conflicting regulations and loopholes in the laws.

In addition, some contents are amended and supplemented, such as: The system of informationem, the data on water resources; the underground water protection; the artificial replenishment of groundwater. All types of works exploiting and using water must have permission; Supplement measures to prevent and respond to droughts, floods, artificial inundation; and solutions for inefficient water exploitation and use works causing degradation, depletion and pollution of water sources. Remove provisions on the conditions of consulting units for planning and basic survey of water resources ▪

Ensuring water security policy in the Law on Water Resources (amended)

NGUYỄN PHƯƠNG TUẤN
Vice Chairman National Assembly Committee on Science, Technology and Environment

With the great demand for the exploitation and use of water resources today, Viet Nam is facing many challenges. Consequently, legislation on water resources and several laws related to managing and protecting water resources must soon be updated, amended, and supplemented. In particular, ensuring water security is an issue that requires synchronous mechanisms and policies to solve, improve the initiative in water resources and ensure the safety of water supply for daily life and essential needs of the people at the highest level in all situations.

1. APPROACHES TO ENSURING WATER SECURITY, MAKE DIFFERENCES TO TRADITIONAL SECURITY

Water security is a type of non-traditional security with common characteristics which includes non-military factors, related to natural and socio-economic factors from both inside and outside the territory, rapidly and widely spreading, impacting on the country's stability and sustainable development.

There are many approaches to ensure water security, such as the view that access to safe drinking water and sanitation is a fundamental human right, the opinion of ensuring that the water source is sufficient to meet the needs and solve the situation of severe drought; ensuring water security requires building and developing water sector infrastructure that is resistant to adverse impacts, including providing the safety of dams and reservoirs...

Each country has its characteristics and views in proposing and implementing solutions to ensure water security. For Vietnam, we can sum up ensuring water security in some specific issues, such as:

Defining views, goals and approaches

Water security is a type of non-traditional security. There are many approaches, but they all include fundamental factors such as ensuring adequate quantity and quality of water for domestic and production needs, ecological and environmental protection, and limiting risks brought by water. Water security needs to be associated with the goal of "proactively ensuring water resources in all situations". The approach of integrated management of water resources is a cross-cutting principle. Also, it is necessary to clearly define resources, in which the state is the key to ensuring water security. And this is a lesson learned in many countries. Combined harmoniously structural and non-structural solutions, especially in response to climate change and different types of water-caused disasters. Strengthen international cooperation, especially with countries in upstream areas and international organizations.

Institutions

Viet Nam has a relatively complete legal system for developing managing, and using water resources (Law on Water Resources, Law on Irrigation, Law on Natural Disaster Prevention and Control, Law on Environmental Protection…). Still, there needs to be unified regulation and detailed guidance on ensuring national water security and rules on coordination among relevant agencies still need to be improved. In addition, there should be a clear assignment of tasks and powers of the parties involved in the implementation process. Review, finalize, or propose the development of international cooperation regulations in managing and using of water resources with countries sharing the same river basin in the new context to ensure national water security proactively.

Investment and finance

Develop investment policies with clear criteria, ensure focused and practical investment, avoid spreading to realize the goals of efficient allocation and use of water resources and ensure national water security. Develop and propose mechanisms to mobilize and encourage the private sector's and stakeholders' participation in investment, development, and expansion of services related to water resources.

Review and develop sustainable financial mechanisms to ensure post-investment efficiency and provide sufficient funding for management, operation and maintenance of irrigation works as well as services related to the water sector. Review to perfect the current irrigation service pricing mechanisms to ensure feasibility in the application, increase revenue and ensure payment rates according to users.

Develop and apply policies on water management and irrigation services according to the demand management approach, including policies: water reuse; water-saving

technology application in use, especially at the end-use level - households; land use planning, especially at the basin level; education to persuade users to save water; water pricing.

Monitoring and evaluation

Build a national data system on water resources and demand and apply remote sensing and GIS technology to support decision-making on water resource management and allocation. Build a monitoring and evaluation system with specific criteria in terms of technical aspects (control of water sources, distribution of water on the system), institutional aspects (Law enforcement), economic aspects (costs, investment efficiency, water price, contribution to GDP, HDI, poverty, income) in the management and use of water sources.

2. SITUATION OF WATER SECURITY AND CHALLENGES OF VIET NAM

2.1. Situation of water security

The situation of water security in Vietnam through 3 periods is as follows:

Period before 1945

Feudal period: Vietnam always took irrigation as the leading technical measure as the foundation for agricultural cultivation. Over the feudal dynasties, although still at a primitive level, the system of dykes and irrigation has helped our people to expand the area of arable land, reclaim many large areas, protect crops and people's lives… During this period, irrigation was managed by the imperial court. Agricultural production depended on natural water.

French colonial period: Irrigation was one of the significant fields in the colonial rule and exploitation policy of French and was managed by the Indochina Government. During this period, irrigation works and dyke systems were built to serve directly for the war of aggression and expansion of colonial agricultural exploitation (by the early 1930s in North and Central Vietnam, France had only invested in building and renovating five irrigation works with a total designed irrigation area of 118,500 ha/2.593 million ha of arable land).

During this period, although the construction of irrigation works has been limited and the full potential of agriculture had not been exploited, initial conditions have been created for agricultural production in the North and Central regions; large areas of land have been utilized and populations have been concentrated in the South. Despite annual reinforcement of dykes and investment in irrigation, overall, our agricultural sector during the French colonial years still had to endure significant risks from natural disasters, droughts, major floods, and frequent dike breaches...

Period from 1945 to 1975

Immediately after archieving independence, the Government paid attention to water management and water control to exploit water resources and mitigate the impact of natural disasters related to water for agricultural production and population protection.

The water management work during the period can be divided into several stages, with different development goals: The focus was on reinforcing and protecting dykes, ensuring efficient management of existing agricultural irrigation systems, expanding the irrigated area combined with small-scale water management (from 1945 to 1954). Efforts were made to restore major irrigation works and expand medium-sized and small-scale projects as part of the economic recovery plan (from 1955 to 1957); The emphasis was on implementing three main principles: water retention, small irrigation and people's participation as a priority in the plan for economic and renovation development (from 1958 to 1960); Strong emphasis was placed on the development of irrigation and land reclamation to boost agricultural production, control droughts and saline intrusion eliminate acidity from the soil, minimize waterlogged areas, flood, storm and saline intrusion control; Initial efforts were made in water treatment and utilization of the Red River within the first 5-year plan (from 1961 to 1965). The focus was on the completion of water management projects, particularly in agricultural areas (from 1968 to 1975).

During this period, there were remarkable accomplishments by the Government and our people in water management. Breakthrough policies and significant solutions were implemented to develop water resources and embankment systems, addressing the initial challenges faced by the Democratic Republic of Vietnam.

Period from 1975 to the present

The first ten years after liberation

During this period, water management primarily focused on serving rice cultivation. In the North region and the Thanh - Nghệ - Tĩnh region, several important irrigation works were constructed according to the planned design and thorough preparations. These works included: Yên Lập Lake (Quảng Ninh), Xạ Hương Lake (Vĩnh Phúc), Núi Cốc - Sông Cầu Canal (Thái Nguyên), Mực River and Yên Mỹ Lakes (Thanh Hóa), Kẻ Gỗ Lake (Nghệ Tĩnh)...

Period from 1986 to the present

During this period, there were changes in the management structure of the irriga-

tion sector from the Ministry of Irrigation to the Ministry of Agriculture and Rural Development (1995), the establishment of the Ministry of Natural Resources and Environment (MONRE) in 2003, the Directorate of Water Resources (2009) and the General Department of Disaster Prevention and Control (2017).

The Law on Irrigation was passed in 2017, preceded by the Dyke Law (2006), the Law on Natural Disaster Prevention and Control (2013), the Law amending and supplementing a number of articles of the Law on Natural Disaster Prevention and Control, and the Dyke Law (2020) and the Law on Water Resources (1998, amended in 2012). Along with the Law system are various Decrees and Circulars... which have also fundamentally changed the role in management, exploitation, use of water and prevention of harmful effects caused by water.

In terms of strategy and planning, the irrigation sector has developed an Irrigation Strategy to 2030, with a vision until 2045. The National Strategy for Natural Disaster Prevention, Control, and Mitigation has also been established. Numerous water resources plans have been formulated and approved to address climate change, sea-level rise in coastal areas, and water resources planning to support the restructuring of the agricultural sector. The MONRE has also developed a national strategy for water resources.

2.2. Challenges (problems) for water security in Vietnam

Dependence on upstream countries

Surface water produced in Vietnam's territory accounts for only 37% of the country's total surface water. The source of water produced from outside the territory, from upstream countries accounts for 63% (90.1% of the Mekong River, 38.5% of the Red River, 18.4% of the Cả River, 27.1% of the Mã River), beyond the direct management capacity of Viet Nam, utterly dependent on the management, exploitation, use, and protection of upstream countries. Upstream countries of international rivers tend to increase investment and exploitation of water sources for hydropower development, water supply for production, and people's livelihood in and outside the basin, along with the impacts of climate change, it will seriously affect the water security of Vietnam, especially the Mekong River Delta and Red River Delta.

Currently, the impacts due to development activities of upstream countries on water flow and pollution to Viet Nam have been recorded through monitoring data at locations flowing into our country on the Đà, Thao and Lô rivers. However, up to now, there have been no effective mechanisms, policies, and measures to cooperate and share water sources among countries having the same water sources.

According to the International Mekong River Commission, the countries of the Mekong Basin have completed. They will continue to build many hydropower reservoirs on both the mainstream and tributaries, with a full storage capacity of tens of billions of m^3 of water equivalent to 20% of the total flow of the Mekong River.

Unevenly distributed water sources in space and time

Viet Nam's surface water resources are unevenly distributed in both space and time. The time variation of annual rainfall manifests itself in inter-year fluctuations and uneven distribution within the year. Viet Nam has an average annual rainfall of about 1,950 mm, among the countries with the largest amount of rain in the world.

Groundwater resources are very unevenly distributed in space; quite abundant, such as in the Northeast region, the Southern Delta; extremely low in the Southeast and the South-Central region and tend to decline.

Declining forest area and quality

Under pressure from population growth and economic development in many regions, many natural and protected forest areas have been reduced. The proportion of watershed protection forest area, which is young forest, poor and exhausted forest with reserves of less than $50m^3$ still accounts for a high proportion compared to the total existing forest area (about 30%). The efficiency of creating aquatic resources is limited. Most of the watershed forest area is distributed in highland and remote areas, so the management and protection of forests face many difficulties.

Increasing levels of water pollution

Water pollution is mainly concentrated in the middle and lower reaches of river basins (Nhuệ, Đáy, Cầu, Đồng Nai), and irrigation works (Bắc Hưng Hải, Bắc Đuống...). Pollution sources from domestic, industrial, agricultural, craft villages, health care wastewater and solid waste are not controlled, which domestic, agricultural, and industrial wastewater account for a large proportion.

The quality of groundwater sources in some areas in recent times is facing salinization and pollution. The situation of saline groundwater is common in the Northern and the Southern coastal plain areas. In addition, heavy metal and ammonium pollution in groundwater has been recorded in most localities with large groundwater exploitation and use.

Increasing demand for water

Viet Nam has an average water volume per capita of $9,000m^3$/year if the total wa-

ter volume is calculated. However, if only the endogenous surface water in the territory is considered, the per capita water volume is only approximately 3,300m^3/year, lower than the Southeast Asian average (about 4,900m^3/year) and at the water shortage threshold (< 4,000m^3/year).

Increasing risks of natural disasters and climate change

According to the report of the Intergovernmental Panel on Climate Change, Viet Nam is one of the five countries in the world most affected by climate change and sea level rise. Climate change and sea level rise will increase the number of extreme, uncertain, and irregular weather patterns, such as prolonged hot weather, reduced dry season rainfall, increased excessive daily rainfall, and increased intensity and frequency of big storms and super typhoons, together with the impact of forest cover loss and inability to adapt to natural disaster risks that will directly and seriously affect water security, the safety of dams, water reservoirs and socio-economic development of the country.

Capacity of the building system

Industrial activities and urban development have been putting tremendous pressure on irrigation infrastructure, increasing service and protection requirements. The demand for drainage of rainwater and flood water is increasing day by day. Hồ Chí Minh City is constantly inundated by high tides; due to the development of urban infrastructure, which reduces the ability to store and drain water. The heavy rain at the end of October 2008 caused severe flooding in Hà Nội City, disrupting operations for many days and causing significant damage.

Risks of unsafety of dams and reservoirs

The implementation of regulations on the safety of irrigation dams and reservoirs has initially changed, however, many local authorities have not yet paid attention to allocating funds for implementation, focusing on small and medium-sized reservoirs. Human resources to manage and exploit dams and reservoirs for irrigation from the provincial level to grassroots irrigation organizations have not yet met the requirements. The force of officials and workers to manage and operate is still insufficient and needs more professional capacity, so the efficiency in performing tasks or advising for directing is low.

The risks of unsafety of dams and reservoirs increase due to extreme rain and floods under the impact of climate change, the decline of watershed forests, and vegetation cover on reservoir basins. From 2010 to the present, there were seventy incidents of dams and reservoirs nationwide. The cause of the incident was due to the influence of rain and flood. The flow to the lake exceeded the design frequency, the main works were damaged or degraded; the capacity of the management units has not met the requirements; most of the dam safety inspection has not been carried out, visual inspection of the dams and reservoirs has been conducted so the hidden dangers in the dam have not been detected.

Institutions, policies

The legal system has been basically completed, the Law on Water Resources, the Law on Irrigation, the Law on Natural Disaster Prevention and Control, the Law on Electricity, the Law on Dykes, the Law on Environmental Protection, the Law on Land, the Law on Forestry... to guiding documents, together with international treaties create an important legal basis for water resource management and safety of dams and reservoirs. However, many Ministries and sectors are jointly managing water sources and the coordination mechanism among Ministries and sectors in water management, exploitation and use are still limited. Sanctions to handle violations are not severe. Conflicts in management, exploitation, and use of water, such as flood control with power generation; power generation with water supply for downstream, pushing salinity; granting permits to discharge wastewater into water sources, irrigation work systems…, increase the risks of water shortage, flooding, waterlogging, and water pollution.

At the Central level, the MONRE performs the role of state management of water resources; The Ministry of Agriculture and Rural Development conducts the role of state management of irrigation, natural disaster prevention and control, and rural clean water; The Ministry of Industry and Trade develops hydropower projects; The Ministry of Transport conducts the role of state management of inland waterways; The Ministry of Construction conducts the role of state management of urban domestic water; The Ministry of Health conducts the role of state management of domestic water quality... leading to the interlacing, lack of synchronization in the process of implementing and performing specific tasks, especially at the local level.

3. RECOMMENDATIONS TO ENSURE WATER SECURITY

Improvement of institutions and policies

Review and improve the legal system, mechanisms, and policies related to water in the direction of demand management, economization, socialization and digital transformation. Perfect the coordination mechanism among ministries and sectors

and local authorities to strengthen decentralization, reduce administrative procedures and be transparent; mobilize resources, create favourable conditions and motivation for organizations and individuals to participate in investment, management, and operation of infrastructure of the water sector, seawater purification, and wastewater treatment; develop and implement mechanisms to encourage people to use water sparingly, improve water use efficiency, reuse water, and protect the water environment.

Resource mobilization

The state budget continues to prioritize investment in the works that are difficult to mobilize social resources and in the construction of large and particularly important works, works in ethnic minority areas, mountainous areas, islands, areas with extremely difficult socio-economic conditions, areas with water scarcity, and areas heavily affected by climate change.

Public investment capital is a guide, a primer to attract spillovers of social capital and supports less attractive but practical projects for disadvantaged areas to share risks with investors.

Attract ODA capital to invest in water storage works, connection of water sources, and works to ensure social security.

Basic survey and planning

Develop visions and development scenarios. Deal with extreme impacts of drought, water shortage, saltwater intrusion, flood, inundation, waterlogging, pollution, water degradation and water environment protection; propose long-term solutions for the Red River Delta, the Mekong River Delta and areas at high risk of water security.

Ensuring the quality of the water environment

Strictly control waste sources; assess load carrying capacity, conduct discharge zoning, allocate wastewater discharge quota; determine the target and roadmap to reduce discharge into the surface water environment, into irrigation works that are no longer able to bear the load; restore rivers and water sources that are seriously degraded and polluted; complete announcement and control of minimum flow in rivers, streams and downstream of reservoirs; strengthen the establishment and management of corridors to protect water sources and the scope of protection of irrigation works.

Increase the ratio of wastewater connection from households and production facilities to the centralized wastewater collection and treatment system. Strictly manage and control the collection and treatment of wastewater and supervise and monitor wastewater, especially for industrial production with pollution risks; increase the wastewater reuse rate after treatment.

Research and propose to develop a project on the Law on Water Pollution Control.

Safety of dams and reservoirs

Non-structural solutions: Review and re-evaluate the functions, tasks, and operating procedures of dams and reservoirs compared with the original design to have solutions to upgrade water storage capacity and respond to extreme floods, operate in real time and aim to serve multiple purposes; Improve the efficiency of using reservoir capacity, including the use of anti-flood power, dead volume in participating in regulating, cutting, reducing flood and supplying water for downstream in drought conditions, water shortage, saline intrusion; Complete the system of management and exploitation of dams and reservoirs in terms of quality of human resources and equipment, apply science and technology, and modernize management and operation.

Structural solutions: Focus on completing repair and upgrading of damaged, degraded, and inadequate dams and reservoirs by 2025, especially for dams and reservoirs with high risks of unsafety, the basin with the flood flow to the lake quickly; ensure the maintenance funding according to regulations; accelerate the completion of ongoing projects. Repair and upgrade to ensure safety for damaged and degraded dams and reservoirs in the 2021-2025 medium-term public investment plan with state budget funds, ODA and other legal capital sources; implement the construction of new water reservoirs in areas prone to frequent droughts, water shortages, salinity intrusion, floods, inundation to store water, transfer water for daily life, production, push salinity, reduce floods to ensure safety for downstream areas.

Prevention, combat, and mitigation of adverse impacts caused by natural disasters and climate change

Strengthen capacity for forecasting and warning of water sources and natural disasters in real-time, provide data in a timely manner, take the initiative in arranging production and daily life activities, and support decision making. Invest in, upgrade, and modernize the monitoring network of hydrometeorology, earthquake, and tsunami; pay attention to upgrading the network of salinity measurement stations and points.

Forest protection and development

Manage, protect and restore natural forests in association with biodiversity conservation, landscape and ecological environment protection. Improve the quality of planted forests, develop high-quality forest; develop large timber forests and non-timber forest products.

Building a monitoring and evaluation system for water security

Strengthen supervision of exploitation and use of surface water, underground water, and discharge of wastewater into water sources. Closely monitor and supervise inter-country water sources.

Science and technology

Promote research, development and application of new, breakthrough, advanced, modern, smart scientific and technological solutions, artificial intelligence, especially achievements of the Industrial Revolution 4.0, step by step implement digital transformation to proactively respond to water-related disasters and adapt to climate change; actively develop, create new water sources, collect, store, regulate, transfer water, link water sources; treat saltwater and brackish water into fresh water on the spot serving the domestic water supply in coastal and island areas; control saltwater intrusion, keep freshwater and store water in rivers, especially in 5 large river basins including Red River, Mã River, Cả River, Đồng Nai River and Mekong River.

International cooperation

Effectively implement international commitments and agreements to which Vietnam participates; actively participate in and expand effective international cooperation on water security, dam and reservoir safety management, with a focus on cooperation in prevention, combat and mitigation of water-related disasters; research and establish mechanisms to settle disputes and conflicts over transboundary water sources, especially in the international river basins of the Mekong, Hồng - Thái Bình.

Communication, awareness raising

Disseminate and educate the legislation to raise awareness and participation of leaders at all levels, the people, and the whole society on ensuring water security and safety of dams and reservoirs, promote the supervision role of people, the participation of stakeholders in proactively storing and using water economically and efficiently.

Renovate the contents and methods of propaganda, combine the traditional methods with propaganda through social networks, integrate into some training curricula ▪

The plastic value chain faces two critical challenges: curbing plastic waste and reducing greenhouse gas emissions. Cohesive regulations are needed to eliminate unnecessary plastics and reuse plastics, develop new delivery models and ensure circularity.

The perspectives in this article, which range from business to supply and demand and youth activism, highlight the significant role of the informal waste sector in addressing plastic pollution.

Global coordination is essential, as plastic use is projected to triple by 2060, requiring a 3% reduction in annual fossil plastic use to meet climate targets. On the World Environment Day, 5th June 2023, it is important to recognize that cohesive regulations are needed to eliminate unnecessary plastics and reuse plastics, develop new delivery models and ensure circularity. Voluntary actions alone are insufficient. A robust treaty with globally binding rules is necessary to combat plastic pollution effectively.

The plastics and chemicals industries will require the most support to build markets for low-carbon products and intermediaries. Currently, there is a high supply scarcity risk for near zero plastic products, based on decarbonization commitments and announced capacity to 2030. At the same time, recycling volumes and demand are projected to skyrocket with growing pressure on industry to reduce the carbon footprint of recycled material. A robust treaty with globally binding rules is necessary to combat plastic pollution effectively.

The perspectives in this article, which range from plastic suppliers to buyers and youth activism, highlight the need for collaboration across industries and sectors. Together, we can drive transformative change and create a sustainable future, where plastic pollution and climate change are effectively addressed. This cannot happen without acknowledging the significant role of the informal waste sector in addressing plastic pollution in regions such as Africa and Southeast Asia. Investors in these regions should prioritise their needs, integrate them into municipal structures and enhance their capacity for collection and value addition.

The plastics value chain is complex and there is a need for collaboration across industries and sectors. Together, we can drive transformative change and create a sustainable future where plastic pollution and climate change are effectively addressed.

Plastic pollution and climate change: Three leaders chart the path forward

THE PLASTIC VALUE CHAIN FACES TWO KEY CHALLENGES

Dr. Bob Maughon - Executive Vice-President, Sustainability, Technology and Innovation, Saudi Basic Industry Corporation (SABIC)

The plastic value chain faces two key challenges: curbing plastic waste and reducing greenhouse gas emissions. The chemical industry has a unique role to play in addressing these challenges. Collaboration between upstream and downstream partners is essential to develop solutions that reduce plastic pollution and emissions in plastic production. SABIC is at the forefront of these efforts.

SABIC has set concrete goals, including a commitment to achieve carbon neutrality by 2050. To realize this goal, the company has outlined a Carbon Neutrality Roadmap that focuses on five pathways: Energy efficiency; Renewable energy; Electrification; Carbon capture, utilization and storage (CCUS); Green/blue hydrogen.

Recognizing the scale of the challenges, SABIC understands that progress cannot be made alone. The Company actively collaborates through initiatives, such as the Low-Carbon Emitting Technologies (LCET) initiative, where chemical companies work together to accelerate the development of technology solutions for carbon neutrality.

Partnerships are also pivotal in tackling plastic waste. SABIC is a founding member of the Alliance to End Plastic Waste, an organization that brings stakeholders from across the value chain together to take collective action on the ground. The Alliance works towards a future where plastic products never end up in landfills or oceans, but instead are reused or transformed into new products. SABIC is also actively involved in driving the transition from a linear to a circular carbon economy.

As responsible plastic producers, SABIC recognizes the importance of offering sustainable materials to customers. We have found ways to increase recycled content, explore alternative feedstocks, design recyclability into products and foster closed-loop initiatives through collaborations across the value chain.

▲ *The plastics value chain is complex and there is a need for collaboration across industries and sectors*

Although the chemical industry has made significant progress, there is still more work to do to achieve our goals. SABIC is already making headway on the complex, long-term effort required and will continue to partner with others to scale up the solutions needed to drive meaningful change.

THE MASS PRODUCTION OF SINGLE-USE PLASTICS HAS LED TO THE DESTRUCTION OF ECOSYSTEMS

The Founder of Green Africa Youth Organization (GAYO) Joshua Amponsem

At the production level, the production of short-lived plastic products (mostly single-use plastics) has been a new gold reserve for the fossil fuel industry. Whilst the industry increased its profits, the mass production of single-use plastics has led to the destruction of ecosystems, such as wetlands, that provide essential environmental services, including carbon sequestration. At the consumer level, recycling has been sold as a solution to prevent pollution, however, over 90% of plastics produced since 1950 have not been recycled. From our observations in the field, this is mainly due to the lack of consideration of the role of waste collectors in the plastic value chain.

In the last decade, the majority of private-sector and philanthropy investments towards sustainable waste management have heavily focused on digital and technology innovations; leaving out key stakeholders at the collection phase - particularly informal waste pickers and informal waste aggregators.

Across all African cities, it is informal waste workers who are fueling the recycling industry. Without them, recycling does not work! Most importantly, they are the ones cleaning up our cities and preventing pollution of our functional ecosystems, as well as reducing flood risks in densely populated areas, where single-use plastics clog drainage systems increasing the occurrence of floods and water-borne diseases during the rainy season. Lastly, it's proven, through projects such as Zero Waste Cities implemented by GAYO and platforms such as Global Plastic Action Partnership, that informal waste collectors are our best chance of empowering households to start segregating at source, to reduce their usage of single-use plastics and to commit to reuse, which is by far one of the most effective ways to solve the pollution crisis.

New investments towards sustainable waste management should prioritise the needs of the informal waste sector, support their integration into municipal structures and increase their capacity to increase collection, as well as adding value to the collected plastics.

PLASTIC POLLUTION IS A SYSTEMIC CHALLENGE

Mrs. Jodie Roussell - Global Public Affairs Lead, Packaging and Sustainability Nestlé and Co-Chair, Policy Working Group of the Business Coalition for a Global Plastics Treaty

Packaging is essential for food and beverage companies; it ensures product quality and safety and prevents food waste. Globally, the amount of packaging that is inappropriately created or managed at the end of its life is a serious and persistent environmental problem. While packaging recycling schemes in many countries have helped to start a circular economy for recovered materials, many regions are not yet at this stage.

Plastic pollution is a systemic challenge. The plastics value chain involves multiple interconnected and interdependent stages. No player or country can solve plastic pollution on its own. We need a harmonised regulatory framework from governments, the implementation capacity of business and the vision and knowledge of academia and civil society to address this together. A comprehensive circular economy approach can address the root causes of plastic pollution and contribute to the global efforts to combat the climate and biodiversity crisis, while delivering economic, environmental and social benefits. A legally binding treaty is the single most important opportunity to accelerate progress towards a circular economy for plastic, building on the lessons learned from existing initiatives.

On the sidelines of the Intergovernmental Negotiating Committee (INC) on Plastic Pollution, actors along the plastics value chain, civil society and government stakeholders have deepened their collaboration to advance the circular economy. An example of such collaboration is the Business Coalition for a Global Plastics Treaty, which gathers over 125 members. The coalition supports three key goals: (i) Reduction of virgin plastic production and use through a circular economy approach, (ii) circulation of all plastic items that cannot be eliminated and (iii) prevention and remediation of remaining, hard-to-abate micro- and macro-plastic leakage into the environment.

Improving packaging design, production processes, reuse and recycling rates, along with end-of-life management can, therefore, make a notable impact. Packaging is essential to us, let us unleash innovation and work towards keeping plastics in the economy and out of the environment ▪

PHẠM ĐÌNH *(Soure: Weforum.org)*

Experience of some experts on nature-based solutions

Action to conserve, restore and sustainably harness the power of the natural world to help address the climate and nature crises now has an internationally agreed name and rallying term - Nature-based Solutions (NbS). 2022 featured a series of big, interrelated moments for the increasing profile of NbS. In March, 193 UN member states agreed to a global definition of NbS which clearly links the sustainable and effective use of nature to tackling the world's myriad sustainable development challenges. In October, the UN Environment Programme (UNEP) and UNEP-World Conservation Monitoring Centre (WCMC) released a policy report collating the key considerations around NbS uptake and set out recommendations for international, national and local leaders to drive progress.

Following that report, the succession of major end-of-year summits - from wetlands at COP14, climate at COP27 and biodiversity during COP15 - all underscored the crucial need to scale up action on NbS. However, while the theme has moved up the global political agenda, there are still many questions being asked around the role, value and inclusivity of NbS.

UNEP is now preparing to launch a series of global and regional consultation sessions, across the public and private sectors, research and civil society, to firm up the global NbS agenda. This process will continue to build consensus on what constitutes appropriate and effective actions, help promote best practice and put in place frameworks for effective, sustainable, and socially inclusive NbS. As we wait for the next steps of high-level action, the UNEP-WCMC and UNEP NbS teams spoke to three leading sector experts about their experience with NbS, the projects that have inspired them and asked for their views on the key opportunities and challenges for scaling up NbS.

▲ *Dr. Musonda Mumba*

1. Dr. Musonda Mumba - Secretary General, Convention on Wetlands

** How have NbS featured in your work to date and how will they feature in your work in coming years?*

Dr. Musonda Mumba: As a "Nature-based" and ecosystem-focused Convention, NbS features in the Convention's work all the time and is part of our modus operandi. Our Contracting Parties designate Wetlands of International Importance (Ramsar sites) based on critical data, science and information that is important to the progression of NbS.

** What do you think is the greatest barrier to scaling up the use of NbS?*

Dr. Musonda Mumba: The greatest barrier for NbS is using data to show what resilient ecosystems look like and, as such, attract funding for NbS. Various data can inform different aspects of key issues, such as livelihoods, species, economic activity, and so on. And a major question is: how do we find the balance to produce the true cost of NbS? And what is the true cost of the absence of NbS (when wetlands are degraded or lost)?

** What excites you most about the opportunities NbS offer?*

Dr. Musonda Mumba: My past work has really provided an opportunity to bring NbS together with all the three pillars of the UN Sustainable Development Goals (SDGs) - social, economic and

environmental - weaving them very neatly. As a result, all the players, whether private or public sector, need to be involved and engaged in NbS at all levels.

** What is your favourite example of NbS in practice and why?*

Dr. Musonda Mumba: Ecosystem based Adaptation (EbA) is my favorite example because it also incorporates elements of Integrated Water Resources Management and other NbS practices. I also found that the adaptation lens of EbA is critical at a landscape or river basin level, having led work focused on EbA in mountain landscapes of Peru, Uganda and Nepal the work at both the policy and programmatic level cut across the pillars of the SDGs. And more importantly, when we talk about NbS we also must also remember that people are central to this.

2. Dr. Baolong Han - Associate Professor of State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (CAS); Secretary-General of Special Committee on Ecological Management, Chinese Society of Ecologgy

** How have NbS featured in your work to date, and how will they feature in your work in coming years?*

Dr. Baolong Han: NbS is mainstreaming significantly in my area. Researchers are paying more attention to how NbS can solve traditional urban challenges, and government officials are increasingly asking about how we can benefit from nature, rather than how much nature needs to be restored. This is an important signal that urban people care more about nature, not just because of its scarcity, but because of the functional benefits from nature.

In future, I predict there will be more researchers and engineers turning to focus on natural capital accounting research and ecosystem service evaluation, especially health services.

▲ *Dr. Baolong Han*

** What do you think is the greatest barrier to scaling up the use of NbS?*

Dr. Baolong Han: In my experience, there are two problems delaying the application of NbS. Firstly, the lack of quantification tools for the benefits of NbS. NbS is not just for eco-restoration, but also for supporting our current mode of life and environment investors always want to know how much we can benefit from the investment in NbS engineering but right now it is hard to answer this question, especially with a monetary evaluation of the benefit. Secondly, there is a misunderstanding about comparing "grey infrastructure" with NbS. Assessors might conclude that NbS has a low efficiency compared to "grey infrastructure", based on NbS performance during a sudden extreme climate problem. For single urban resilience issues, such as urban flooding, NbS cannot deal with all run-offs or flooding immediately. And some NbS may not work in winter, for example because of low temperatures meaning not enough heat for plants. But the value of NbS is in its multiple services: one NbS engineering project can provide more than ten different kinds of ecosystem services, such as carbon sequestration, water conservation, recreation, and so on.

** What excites you most about the opportunities NbS offer?*

Dr. Baolong Han: NbS gives cities the opportunity to get closer to nature. Smart mayors will not let their city become a cement forest, but a city in a forest. As an individual citizen, I want more natural spaces for my family. NbS is the right way to use nature for sustainable human development, and as a researcher, NbS is a new, exciting and massively important research area, working towards re-coupling the relationship between humanity and nature.

▲ *Dr. Valerie Kapos*

** What is your favorite example of NbS in practice and why?*

Dr. Baolong Han: In terms of NbS engineering, the Government of China has embarked on the biggest national parks system in the world. This is good for both China and the world's biodiversity conservation. In terms of NbS management, the central and local governments are mainstreaming the evaluation of ecosystems by releasing technical guides to help green more urbanized areas and cities, such as Beijing and Shenzhen. More people and Governments are beginning to think about both nature's multiple benefits and monetary benefits, which is ultimately good for NbS investmen.

3. Dr. Valerie Kapos - Principal Technical Specialist, UNEP-WCMC

** How have NbS featured in your work to date, and how will they feature in your work in coming years?*

Dr. Valerie Kapos: As a forest ecologist with a keen interest in ecosystem function and services I have always had a strong awareness of the way ecosystems mediate environmental change and its impacts on people. My focus on forests led naturally to exploring and supporting their role in mitigating climate change, for example, via the REDD+ Program - and UNEP-WCMC's climate change and biodiversity linked work programs have rapidly expanded to cover the roles of other ecosystems and the contribution that ecosystems can make to climate change adaptation. These workstreams have now evolved into UNEP-WCMC's dedicated NbS impact area and focal initiatives. I am also keenly interested in other NbS applications, such as to support people's health and well-being in the face of multiple 21st Century challenges.

** What do you think is the greatest barrier to scaling up the use of NbS?*

Dr. Valerie Kapos: On the one hand there is a lack of awareness understanding and capacity among those making decisions on ways to address societal challenges (including finance) and implementing changes, and on the other hand there are challenges linking lots of to-date site scale interventions to create larger impacts at landscape scale and beyond.

Improving monitoring and evaluation will help to generate evidence on effectiveness, especially for adaptation interventions, which is critical to increasing NbS awareness, interest and uptake.

** What excites you most about the opportunities NbS offers?*

Dr. Valerie Kapos: Their ability to deliver multiple benefits (including and especially for biodiversity) and have a positive impact in addressing several environmental and societal challenges at once.

** What is your favorite example of NbS in practice and why?*

Dr. Valerie Kapos: I am impressed by catchment-scale ecosystem restorations that work to secure both consistent water quantity and quality for the benefit of local people, but also water-dependent industry and energy provision, as well as some of the innovative financing approaches that are involving multiple stakeholders and enabling large-scale implementation. I am also keen on approaches that provide solutions to both terrestrial and coastal challenges, including improved conservation and management of upland natural and agricultural ecosystems, as well as wetland restoration ▪

VŨ HỒNG

(Source: http://www.unep.org)

Drive to protect world's wetlands

Vegetated wetlands, such as swamps and marshes, are some of the most wildlife-rich ecosystems on the planet, their shallow waters and abundant plant life supporting everything from insects to ducks to moose. But these wetlands, as well as lakes, rivers and other watery environments around the world, are in peril, with many polluted or degraded as a result of climate change and human development.

In recent months, though, Governments have stepped up their efforts to protect and restore these natural spaces, a drive experts say is not only crucial for protecting biodiversity, but also countering the climate crisis. A November 2022 meeting of the Ramsar Convention on Wetlands raised the profile of wetlands and their crucial role in achieving the Sustainable Development Goals, humanity's blueprint for a better future.

The following month at the United Nations Biodiversity Conference, countries reached a landmark agreement to protect nature, a deal that included a provision to restore at least 30 percent of degraded inland water bodies and conserve healthy freshwater ecosystems in an equitable way. Coastal and freshwater wetland ecosystems are home to 40 percent of all biodiversity. Peatlands, a particular type of vegetated wetland, store twice as much carbon as the world's forests. Yet, over the past 200 years, wetlands have been drained to make way for farmland or infrastructure development.

Around 35 percent of the world's wetlands, which also reduce the impact of flooding and cleanse polluted water, were lost between 1970 and 2015. The loss rate has been accelerating since 2000.

Depending on the amount of sea-level rise caused by the climate crisis, 20 - 90 percent of current coastal wetlands, which sequester carbon up to 55 times faster than tropical rainforests, may be lost by the end of the Century. Wetlands - important stopovers for migratory birds - have also lost more biodiversity than other terrestrial and marine ecosystems.

"In line with the UN Decade on Ecosystem Restoration, we must stop policies and subsidies that incentivize deforestation and wetlands degradation from source to sea and promote their urgent restoration", says Mrs. Leticia Carvalho, head of the Marine and Freshwater Branch at the UN Environment Program (UNEP).

"At the same time, we must guide and drive investments to protect priority ecosystems, such as peatlands, and encourage the private sector to commit to deforestation and peatland-drainage-free supply chains," she adds. That message comes just ahead of World Wetlands Day, which falls on 2nd February. This year the day highlights the urgent need to restore wetlands. It is also a precursor to the UN Water Conference, an international gathering that begins on 22nd March.

Aware of the risks of wetland degradation to economies and societies, in March 2022, countries at the UN Environment Assembly adopted resolutions on lakes and nature-based solutions. This followed resolutions specifically on peatlands, which helped raise global awareness of the importance of conserving and restoring wetlands of all kinds. The resolutions were designed to pave the way for action and for local and national conservation campaigns that include Government backing and finance.

Back from the brink

Countries around the world are now beginning to restore their wetlands. Examples of wetland conservation initiatives include the development of emerging sponge cities in China and the Government-backed restoration of the United Kingdom's Great North Bog, a significant area for both carbon and water storage. Research shows that accelerated efforts to conserve and restore wetlands are crucial as the triple planetary crisis of climate change, nature and biodiversity loss and pollution and waste is amplifying the effects of wetland degradation. But adequate finance and political will are key.

According to UNEP's 2022 State of Finance for Nature report, climate, biodiversity and land degradation goals will be out of reach unless investments in nature-based solutions quickly ramp up to US$ 384 billion per year by 2025. That would be more than double the current total of US$ 154 billion a year.

"We're running out of chances to protect the services provided by wetlands that societies depend on for a sustainable future", said Mrs. Leticia Carvalho. "We must ramp up international solidarity, capacity-building and funding without further delay."

▲ *Covering bare peat with Sphagnum-rich heather brash is a crucial part of peatland restoration in Northern England*

Good news from Argentina

In December 2022, legislators in Argentina's Southernmost Tierra del Fuego Province passed a law to permanently protect the rugged Mitre Peninsula. This remote corner of South America is home to underwater kelp forests and one of the largest peatland complexes in South America, two powerhouse ecosystems that combined make up Argentina's biggest carbon sink.

The creation of the new protected area, roughly the size of the Grand Canyon National Park in the United States, is an important step to counter the climate crisis, say experts. The Global Peatlands Initiative, coordinated by UNEP, has been campaigning for the protection of South America's peatlands for several years.

The success in Argentina is a small piece of good news for peatlands, which make up about half of the world's inland vegetated wetlands. According to the UNEP-supported Global Peatlands Assessment, the Earth is losing 500,000 hectares of peatlands a year, an area almost twice the size of Egypt's sprawling capital, Cairo. The draining and degradation of peatlands releases massive amounts of carbon dioxide and contributes around 4 percent of global human-induced greenhouse gas emissions.

"This is exactly what the protection of key habitats should look like", said Mrs. Kristine Tompkins, a UN Patron of Protected Areas and the Co-Founder of Tompkins Conservation, an environmental non-profit group. "This park is a new highwater mark for global conservation and the fight against climate change".

World Wetlands Day on 2nd February seeks to drive awareness of the benefits of wetlands and encourage people to conserve and sustainably use these landscapes. UNEP is a long-time supporter of efforts to protect wetlands and monitors their status, along with the Ramsar Convention on Wetlands. UNEP helps countries monitor and protect wetlands and other ecosystems in the 2030 Sustainable Development Agenda. New data collection for Sustainable Development Goal 6, which covers water and sanitation, is being launched in the spring of 2023 ▪

BẢO BÌNH

(Source: http://unepdhi.org)

Can "biodiversity credits" propel global conservation?

Backed by the UN, an alliance of conservationists and policymakers is devising new ways to finance the preservation of biodiversity by placing economic values on ecosystems. Some analysts say such schemes have the potential to boost conservation, but others are skeptical.

In 2009, as global financial markets shuddered, Mr. David Dorr became interested in the possibility of putting a price on nature. He is a Cayman Islands-based global macro trader. The economic crisis, Mr. David Dorr had realized, paled beside the looming environmental one. He knew about carbon credit schemes, in which people, governments, or companies pay for the storage or removal of carbon from the atmosphere to offset their greenhouse gas emissions. But he wanted something broader, a way to judge the value of nature not in an extractive sense, nor by the so-called ecosystem services that nature could provide, but by its own inherent value. Scientists, conservationists and policymakers around the world are working to develop what they call biodiversity credits. While varied in detail, these credits are alike in their purpose: attaching economic value to the preservation or restoration of ecosystems.

Only a few companies currently have biodiversity credits for sale, but many more are working to develop them. In broad outline, it works like this. Companies developing biodiversity credits identify a threatened habitat and form a partnership with the owners of that land. The company or a third party then conducts a biological survey to establish the habitat's baseline condition, using factors like species richness, ecological integrity, and water quality. The company then devises a plan for improving habitat and protecting it over a given stretch of time, usually a decade or longer. At given intervals, perhaps every year or two, the company, or the third party, monitors its progress. If the habitat has met the agreed-upon goals of improvement, it generates a biodiversity credit, which someone else can buy. Revenues from the credit are split between the landowner and the biodiversity credit developer.

"We only get paid when we deliver the performance outcomes", says Ms. Mariana Sarmiento - CEO of Terrasos, a Colombian Company that last year became one of the first to offer biodiversity credits for sale, with 62,000 12-square-yard plots of conserved or restored ecosystems that will be managed for 30 years. The price is currently around 30 euros per unit, and slightly more than 100 have been sold so far.

Many people hope, like Mr. David Dorr, that these biodiversity credits will eventually be standardized, as carbon credits are, with consistent contents and price, and can then be traded internationally in the manner of commodities. They argue that biodiversity credits could provide a way to fund conservation on an unprecedented scale. The need is acute: According to a recent World Economic Forum paper, estimates of the cost to halt the current global loss of biodiversity are as high as US$ 1 trillion annually. Less than US$ 150 billion is currently spent on such efforts each year.

Although only a few companies currently have biodiversity credits for sale, many more are working to develop them. Already, large players in the carbon credit industry are getting involved. One challenge lies in showing that the money spent on these credits has its desired effect. This problem has plagued the carbon credit market since its inception in the early 2000s. But developers of biodiversity credits face another hurdle, unique to their endeavor, which is that unlike carbon, which can be quantified using weight-based metrics, biodiversity is diffuse. Even Mr. E. O. Wilson, an American biologist, struggled to concisely define it, writing that it encompasses "the totality of hereditary variation in life forms, across all levels of biological organization" from genes to individual species to entire ecosystems. Setting a value for the protection or preservation of such diversity is difficult. Applying a consistent value to a biodiversity credit generated in the Amazon rainforest and one from the Sahara Desert is even harder.

One company is developing credits that will each protect one hectare of habitat and its wildlife for at least 10 years. An environmental economist at the French Agricultural Research Centre for International Development Alain Karsenty is in favor of biodiversity credits - or "certificates", his preferred term. But he says he is "not sure biodiversity certificates will attract a large amount of money and buyers".

The phrase "biodiversity credit" has appeared in the scientific and conservation policy literature for at least 20 years, usually in reference to what are also called "biodiversity offsets", legally mandated in some countries. In 2020, Mr. Paul Steele,

an economist at the International Institute for Environment and Development (IIED) published a paper with his IIED colleague Ina Porras proposing a new use of the phrase. These biodiversity credits, or "biocredits", would operate on a voluntary basis, underpinned by supply and demand: On the one hand were those who wanted to contribute funding to conservation; on the other hand, were conservationists and landowners who needed funding to do that work. The scheme would be able to fund protection and restoration of places rich in carbon, like peat swamps, and those poor in carbon, like deserts.

At first, the paper seemed to flop, Mr. Paul Steele says. But over the next two years, the idea took off. A South African ecologist - Simon Morgan, says he and his colleagues came to the idea of biodiversity credits after watching the Covid-19 pandemic devastate tourism in Africa. "So much of our conservation efforts are underpinned by tourism", he says. With his colleagues, he founded ValueNature, which is now developing global biocredits that will each protect or restore one hectare of habitat and its wildlife for at least 10 years.

Mr. Simon Morgan quickly realized that people in other parts of the world were doing similar work. The concept gained more momentum late last year after the parties to the Convention on Biological Diversity adopted the so-called Kunming-Montreal Global Biodiversity Framework, which sets global conservation targets through 2030. Among other things, the parties agreed to provide funding for "innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits and benefit-sharing mechanisms, with environmental and social safeguards".

▲ *A forest in South Australia for which the GreenCollar Company is developing biodiversity credits*

ValueNature is the Acting Secretariat of the Biodiversity Credit Alliance, which it founded last year, and which is funded by the United Nations Environment Program, the UN Development Program and the Swedish Development Agency. The Alliance's 80-odd members include carbon credit companies, tree-planting companies, universities, laboratories, conservancies, and consultancies, along with several companies and organizations that aim to develop biodiversity credits. Members of the Alliance agree that they must be diligent in proving that biocredit buyers are getting what they pay for. The Alliance is now working to develop a set of standards and definitions. One principle that appears to have wide support among members is that of additionality, which requires biocredits to be based on either measurable improvement of a degraded ecosystem or protection of an ecosystem under imminent and provable threat. Additionality prevents the sale of credits for healthy land that's already protected.

Mr. Simon Morgan thinks distributed ledger technology, or blockchains, could help with transparency, offering a way for biocredit developers and biodiversity custodians to provide data directly to funders on their ecological restoration efforts. ValueNature plans to upload the information it collects from camera traps, bioacoustics monitors and remote sensing technologies directly onto its digital ledger, creating "an immutable data stream".

Naturally, disagreements exist over what the biocredit industry ought to look like. In a 2022 paper, Mr. Paul Steele and his IIED colleague Anna Ducros argued that people developing biocredits should focus on alleviating poverty, with the biggest share of any revenues going to Indigenous people and local communities. Ideally, these populations would be the ones developing and selling the biocredits, he says, "so it's more than just getting a kind of handout from the proceeds that some other middleman or middlewoman - normally a man - is developing".

But Mr. David Dorr, the global macro trader, believes there is an important role for the middleperson to mediate between the biocredit developer and the biocredit buyer. In that role, a trader can invest money in projects in a speculative manner, he says, allowing developers to get their project to the point of sale. The trader, he claims, also provides an important layer of vetting for potential buyers, meanwhile, ensuring that the credits are accredited and otherwise satisfactory. Pure and unfettered capitalism, including its middle people, he says, is the best way to join the many potential buyers of biocredits with the many ecosystems in need of conservation and restoration.

But an inescapable hurdle remains: Despite long efforts, there is still no standard metric for trading. Ekos, a New Zealand carbon credit developer and accreditor that is also part of the Biodiversity Credit Alliance, is working on its own proprietary biodiversity credit. Ms. Jemma Penelope, an Ekos senior consultant, thinks it's unlikely that a consistent and widely translatable unit will emerge. "At the moment, we don't see a single unit of biodiversity ever really being able to give us what we need", she says. "Because ultimately for us, it's funding communities to look after their ecosystems. We're not here to meet the needs of the financial system".

Others insist a standardized unit is both possible and desirable. Terrasos, the Colombian biocredit developer, provides an example of how a universal biocredit might work. To assess the potential value in biocredits of a given area of land, the company compiles data on the rarity of the ecosystems that land contains, its state of degradation and restoration potential, how it contributes to ecological connectivity, whether it contains species on the IUCN's Red List and other factors. It enters these data into an algorithm that calculates the number of credits that the project can issue. Habitats that are more threatened provide more potential biocredits and habitats that are less threatened provide fewer.

It remains unclear whether biocredits will ever take off and reach a global audience. Still, Mr. David Dorr can picture the final steps: After the biocredits are created and certified by an independent body, a trader will assign them a monetary value. He is currently working on this process, considering the typical cost of carbon credits and of ecological preservation and restoration. Eventually the right price will be found, he says and biocredits will flood onto the market followed by the money of donors, which will flow to where it will do the best - a quantity of good, he says, that will exceed what conservationists can currently imagine ▪

PHƯƠNG TÂM

(Source: Yale University - https://www.yale.edu)

As it drives through the pristine, waste-free streets of Indore, India, the small garbage truck is impossible to miss. Behind its bright yellow cabin, the vehicle's rear compartments are a patchwork of six vibrant colors reminiscent of a pop art painting. Labels clearly indicate that each colored compartment is dedicated to a different form of household waste.

Even without seeing the eye-catching array of colors, residents down the street already know to expect the garbage truck's arrival before it turns into the neighborhood. For years, thanks to guidance from government officials and campaigners, each of the households in this "zero-waste" ward has committed to sorting its rubbish into categories, says Tanya Mukherjee, a consultant with the city. "Indore has understood that the heart and soul of (environmentally sustainable) waste management is segregated collection at source", Ms. Tanya Mukherjee says. "If you can transport waste in a segregated manner, you do not need extra resources or space to store and process it. You will not put your workers' dignity, their safety at risk".

Segregated waste collection is just one part of an intricate web of zero-waste initiatives that has helped Indore remain India's cleanest city for six years in a row. The city employs some 15,000 people in waste management. Through education and training systems, robust household composting initiatives, financing, technologically advanced processing plants and more, Ms. Tanya Mukherjee said Indore has "taken back control" of the waste crisis that once afflicted it.

For environmental campaigners, Indore is a shining example of how cities can counter what they call one of the gravest threats to the planet: a torrent of trash. Every year, humanity produces more than 2 billion tons of municipal solid waste, of which 45 percent is not managed in controlled facilities. Without urgent action, this will rise to nearly four billion tons by 2050.

Waste - including plastic packaging, food, clothes, electronics and debris from mining and construction sites - leads to disastrous consequences for

Cities embrace "zero-waste" philosophy amidst torrents of trash

human health and the economy and aggravates the triple planetary crisis of climate change, nature and biodiversity loss, and pollution. It disproportionately affects the poor, and up to 4 billion people lack access to proper waste disposal.

30th March 2023 marks the inaugural International Day of Zero Waste. Facilitated by the United Nations Environment Program (UNEP) and the UN Human Settlements Program (UN-Habitat), the day promotes zero-waste initiatives and highlights how they can reduce resource use and produce less waste and pollution at all stages of a product's life cycle to advance sustainable development.

"Zero Waste Day is about finding innovative solutions to the scourge that is waste and moving towards a more sustainable future that protects the environment and improves human health", says Director of the Industry and Economy Division at UNEP Sheila Aggarwal-Khan. "To achieve this, Governments must ensure that less waste is produced through products that stay in the economy and then, where waste is produced, it is turned into a resource that can be fed back into the economy. Governments can create the enabling environment for responsible production and consumption patterns to advance the shift towards a circular economy".

What is zero waste?

Zero waste is shorthand for efforts to reduce, reuse, redesign and recycle, to throw away less by making better use of what humanity produces and to design products that do not end up as waste, especially after just a single use. The benefits of zero waste include clean seas and fresh air, fertile soils and sanitary cities, and resilient economies and sustainable extraction. This is a key component of circularity, which is the concept that the potential waste a product generates by the end of its life is considered at the point of manufacture. A circular economy involves the reduction and minimization of waste throughout product life cycles.

Zero waste requires action from all stakeholders - including Governments, civil society, businesses, academia, communities, women and youth, says Ms. Sheila Aggarwal-Khan.

In Nigeria, a UNEP-led project funded by the Global Environment Facility (GEF) has driven ground-breaking legislation that holds manufacturers financially and legally responsible for pollution that their products create. The soon-to-be-concluded three-year, US$ 15 million project has been a boon for Nigeria's often risky and informal e-waste processing industry, which employs 100,000 people.

The project has helped to create formal e-waste collection centers, provide personal protective equipment to workers and support improved education for Government officials, value-chain workers and informal workers. It has also helped waste collectors and informal pickers safely extract valuable resources from 300 tons of electronic waste so far. "Reducing waste requires action at all levels, and it's critical we equip governments, industry, and consumers with the knowledge to make informed decisions to appropriately manage their waste," says Mr. Ludovic Bernaudat, Head of the Knowledge and Risk Unit in UNEP's Chemicals and Health Branch. "It's important we do not sideline informal waste-pickers, who rely on waste for their livelihoods and bear the brunt of global waste streams".

Governments can bolster effective e-waste management by requiring manufacturers and sellers to reuse electronics at the end of their life cycles and establishing consumers' right to repair products, experts say. UNEP and the GEF are also supporting the Governments of Bangladesh, Indonesia, Pakistan and Viet Nam to spearhead the movement to tackle waste in the global textiles industry through a five-year, US$ 43-million Program.

The four big clothes-producing countries are strengthening regulations and help their manufacturers - which employ 10 million people and produce 15 percent of global clothing exports - to reduce the use of hazardous chemicals in bleaching, dyeing and other forms of textile processing. The Program will bring public policy up to the standards of international best practice and equip companies with the tools and knowledge to better manage hazardous chemicals, protect their workers and reduce the leakage of toxic "forever chemicals", a family of approximately 12,000 synthetic chemicals.

Globally, innovations to manufacturing and dyeing are needed to address the textile industry's high resource use, while new technologies must be developed to improve reuse, upcycling and recycling when materials reach their end-of-life stage, according to a 2020 UNEP report. As well, UN-Hab-

itat has helped cities improve their waste management through Waste Wise Cities and the African Clean Cities Platform. More than 400 cities and 60 partners have joined these networks and committed to improving waste management and advocating for zero-waste good practices.

The Waste Wise Cites Tool has supported the development of comprehensive waste management plans and tangible projects in cities around the world since its launch in 2021. This includes a US$ 7-million project to improve municipal solid waste management in 13 coastal cities in Lebanon, a nine-city project in the Dominican Republic and a US$ 3-million project in Dar es Salaam, Tanzania. Data from the tool also helped inform the global estimate of SDG indicators 11.6.1, which provides important information and insights on the transition towards zero waste at global, national and local levels.

With the impacts of waste mounting, communities have also turned to zero-waste initiatives. La Pintana, an urban municipality located south of Santiago, Chile, has successfully run a community program to manage organic waste since 2005. Through the project, residents in the municipality separate food at the household level, enabling approximately 36 tons of organic waste to be composted per day and saving the municipality US$ 750 daily.

Celebrating Zero Waste Day

Türkiye, which put forward the resolution establishing the International Day of Zero Waste alongside 105 other countries, is among the leaders of the Zero-Waste movement. Through its zero-waste project launched in 2017, the Government provides support for the establishment of zero-waste management systems across all 81 provinces. The project has helped recover 33 million tons of recyclable waste, including 20 million tons of paper and cardboard and 5 million tons of plastic. This has resulted in about 62 billion Turkish lira (US$ 3.3 billion) in economic gain and savings in energy and water use and storage space.

International Day of Zero Waste, observed for the first time on 30th March 2023 and jointly facilitated by UNEP and UN-Habitat, aims to raise awareness of the importance of responsible consumption and production practices and urban waste management. The day calls for rethinking humanity's waste-related practices and for embracing a circular economy, which means reducing resource use and emissions to the environment throughout all stages of a product's life cycle. This is considered key to addressing the triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste.

"Habits have begun to change with population growth, urbanization, industrialization and technology, (meaning) urgent measures should be taken", says Ms. Şule Bektaş, a branch manager in the Ministry of Environment of Türkiye. "Zero waste is about redesigning our systems and changing our habits so that all resources are used sustainably. We aim to leave a clean and developed Türkiye and a livable world to future generations".

▲ *Indore people (India) have actively responded to the City's environmental protection activities*

As the world celebrates the first International Day of Zero Waste, experts hope that promoting zero-waste initiatives and highlighting the waste crisis can inspire action globally. "Zero Waste Day is an opportunity to rethink our consumption style, refuse wastefulness, find values for reuse and recycle materials", says Chief of Urban Basic Services of UN-Habitat Şule Bektaş. "Let us think how we and our society can be waste-wise on this day" ▪

NAM VIỆT *(Source: http://www.unep.org)*

How using nature's tools is helping to clean up urban rivers

In the Delaware River and other waterways and estuaries across the United States, scientists and conservationists are restoring aquatic vegetation and beds of mussels and oysters to fight pollution and create a strong foundation for healthy ecosystems.

On a summer morning of last year near Camden, New Jersey, two divers from the U.S. Environmental Protection Agency hovered over a patch of sediment ten feet below the surface of the Delaware River. With less than two feet of visibility in the churning estuary, they were transplanting a species crucial to the ecosystem: Vallisneria americana, or wild celery grass. One diver held a GoPro camera and a flashlight, capturing a shaky clip of the thin, ribbon-like blades bending with the current.

Watching the divers' bubbles surface from the EPA's boat was an experiential programs supervisor at the Center for Aquatic Sciences at Adventure Aquarium in Camden Anthony Lara, who had nurtured these plants for months in tanks, from winter buds to mature grasses some twenty-four inches long.

This was the first planting of a new restoration project led by Upstream Alliance, a nonprofit focused on public access, clean water and coastal resilience in the Delaware, Hudson and Chesapeake watersheds. In collaboration with the Center for Aquatic Sciences, and with support from the EPA's Mid-Atlantic team and the National Fish and Wildlife Foundation, the alliance is working to repopulate areas of the estuary with wild celery grass, a plant vital to freshwater ecosystems. It is among the new, natural restoration projects focused on bolstering plants and wildlife to improve water quality in the Delaware River, which provides drinking water for some 15 million people. Scientists are focusing on organisms like bivalves and aquatic plants to help nature restore fragile ecosystems.

Such initiatives are taking place across the United States, where, 50 years after passage of the Clean Water Act, urban waterways are continuing their comeback, showing increasing signs of life. And yet ecosystems still struggle, and waters are often inaccessible to the communities that live around them. Increasingly, scientists, nonprofits, academic institutions and state agencies are focusing on organisms like bivalves (such as oysters and mussels) and aquatic plants to help nature restore fragile ecosystems, improve water quality and increase resilience.

Bivalves and aquatic vegetation improve water clarity by grounding suspended particles, allowing lighter to penetrate deeper. They also have an exceptional capacity to cycle nutrients - both by absorbing them as food and by making them more available to other organisms. Thriving underwater plant meadows function as carbon sinks and provide food and habitat for scores of small fish, crabs, and other bottom-dwellers. Healthy bivalve beds create structure that acts as a foundation for benthic habitat and holds sediment in place.

"Why not take the functional advantage of plants and animals that are naturally resilient and rebuild them?", says Mr. Danielle Kreeger, science director at the Partnership for the Delaware Estuary, which is spearheading a freshwater mussel hatchery in southwest Philadelphia. "Then you get erosion control, water quality benefits, fish and wildlife habitat, as well as better access for people".

One hundred miles north of Philadelphia, the Billion Oyster Project has been restoring the bivalves in New York Harbor since 2010, engaging more than 10,000 volunteers and 6,000 students in the project. Oyster nurseries are being installed in Belfast Lough in Northern Ireland, where until recently they were believed to have been extinct for a century. And a hatchery 30 miles west of Chicago has dispersed 25,000 mussels into area waterways, boosting the populations of common freshwater mussel species.

Underwater vegetation restoration projects have been underway in the Chesapeake Bay and Tampa Bay for years, and more recently in California where seagrass species are in sharp decline. Morro Bay, for example, has lost more than 90 percent of its eelgrass beds in the last 15 years. The California Ocean Protection Council's 2020 Strategic Plan to Protect California's Coast and Ocean aims to preserve the mere 15,000 acres of known seagrass beds and cultivate 1,000 more acres by 2025.

Scientists stress that these projects must be implemented alongside strategies to continue curbing contaminants, mainly excess nutrients from sewage and fertilizers, flowing into our waterways - still the most critical step in improving water quality. After several decades of aquatic vegetation plantings in the Chesapeake Bay, for example, scientists say that the modest increase of plants is largely due to nature restoring itself following a reduction in nutrient pollution. Researchers were surprised to find aquatic grasses thriving in parts of the Delaware River near Philadelphia.

And any human intervention in a complex ecosystem raises a host of compelling concerns, such as how to ensure sufficient genetic diversity and monitor competition for food and resources.

Still, in areas where the natural environment is improving, bringing back bivalves and aquatic plants can create a lasting foundation for entire ecosystems. And restoration initiatives are an active form of stewardship that connects people to their waterways, helping them understand the ecosystems we depend on for our survival.

Until five years ago, the extent of wild celery grass beds in the Delaware estuary was a bit of a mystery. Many scientists did not think the water quality was suitable and since the estuary contains a lot of sediment and soils with the tides, the plants were not visible in aerial imagery. But in 2017, EPA researchers started surveying by boat to detect submerged vegetation and were surprised to find the plant thriving in parts of a 27-mile stretch of the Delaware River from Palmyra, New Jersey, past Camden and Philadelphia, to Chester, Pennsylvania. That is the only section of the river designated by the Delaware River Basin Commission as unsafe for "primary contact recreation" - activities like jet skiing, kayaking and swimming.

The discovery of healthy grass beds was exciting, says the EPA Mid-Atlantic region's senior watershed coordinator Kelly Somers, because the plant is an indicator of water quality. The EPA's research, accessible via online maps, has been especially helpful for the Upstream Alliance's restoration work, says Founder and President Don Baugh, because most of the research on wild celery grass is from other places - primarily the Chesapeake Bay. The restoration of

▲ *Murky river water is filtered by mussels in the tank on the right*

wild celery and other aquatic plant species has been underway there for more than 30 years.

Among the Chesapeake's experts is Mike Naylor, aquatic biologist for the Maryland Department of Natural Resources, who, back in the 1990s, was pulling National Archives images of the Chesapeake Bay to find out what Bay grass beds looked like in the 1930s and 1950s. When combined with similar research by the Virginia Institute of Marine Science, he found that at least 200,000 acres of underwater vegetation flourished in the bay in those decades, dropping to about 38,000 by 1984.

In recent years, scientists on the Chesapeake Bay have switched from transplanting adult plants to direct seeding, which is far less resource-intensive and laborious. More efficient techniques combined with site selection informed by accumulated data on plants' requirements could significantly boost the success of restoration efforts. Still, scientists agree that the modest increases in seagrass growth over the last 30 years are mainly due to natural repopulation following improvements in water quality.

"In the Chesapeake Bay, the thing that has led to wide-scale (aquatic vegetation) recoveries is nutrient load reductions," says Ms. Cassie Gurbisz, Assistant Professor in the Environmental Studies Program at St. Mary's College in Maryland. Excess nutrients - mainly nitrogen and phosphorus from sewage and agricultural runoff - are among the biggest detriments to water quality. And it is a problem that bivalves can help address. The Billion Oyster Project, which has restored oysters at 15 reef sites, is working to determine how oysters affect - and are affected by - water quality. The project's goal is to restore one billion oysters to New York Harbor by 2035.

A 2017 pilot project in the Bronx River Estuary studied the cleaning capabilities of the marine ribbed mussel. Researchers estimated that 337,000 adult ribbed mussels floating in the estuary could sequester 138 pounds of nitrogen in their tissues and shells in six months. As it eats, a single mussel can filter up to 20 gallons per day, remove excess nitrogen both by assimilating it into their shells and tissues and burying it in the sediment as waste. Because they're especially sensitive to poor water quality, freshwater mussel species are among the most endangered groups of animals.

"In some watersheds, the reasons why they went away are still there, and so they're not really yet restorable", says Dr. Danielle Kreeger of the Partnership for the Delaware Estuary, which has been researching freshwater mussels in the region for 15 years. The reasons include habitat destruction caused by dredging or filling, sedimentation or siltation from runoff, and climate change factors like warming water and increased stormwater runoff. "In many areas, water quality has come back enough, and habitat is stable enough that you can rebuild", says Dr. Danielle Kreeger. The partnership's proposed hatchery and education center would have the capacity to propagate 500,000 native mussels each year.

One concern is that releasing large numbers of hatchery-raised mussels could dilute genetic diversity. Dr. Danielle Kreeger says the hatchery team is working on biosecurity and genetics preservation plans to address the concern that releasing large numbers of hatchery-raised mussels could dilute genetic diversity and introduce diseases in the wild.

"Propagation or restoration projects should maintain the current genetic makeup and diversity and should not disrupt the natural and evolutionary processes", says Mr. Kentaro Inoue, Research Biologist at the Daniel P. Haerther Center for Conservation and Research at Shedd Aquarium in Chicago. He is working with the Urban Stream Research Center's hatchery - which has released about 25,000 mussels into Chicago-area waterways - to analyze DNA samples from restoration sites.

The key issue is that many propagated animals have the same maternal genetics. The first 24,000 juveniles released by the hatchery were the progeny of just four mother mussels. The center is working to mitigate some of these concerns by tagging their mussels so as not to propagate animals with the same genetics in a subsequent season. Even still, "we need to conduct more post-release monitoring after releasing hatchery-reared juveniles into the wild", says Mr. Kentaro Inoue. Despite these concerns, scientists say bringing back bivalve and aquatic vegetation communities is an important tool to continue improving water quality ▪

CHÂU LONG

(Source: http://e360.yale.edu)

Determining the rational cost of product and packaging recycling (Fs) for extended producer responsibility (EPR)

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According to the provisions of the Law on Environmental Protection (LEP) 2020 and Decree No. 08/2022/ND-CP dated January 10th, 2022 of the Government detailing a number of articles of the LEP, manufacturers, and importers of several types of products (batteries - accumulators, lubricants, tires, electricity and electronics, vehicles) and some packaging (food, cosmetics, drugs, fertilizers, animal feeds, veterinary drugs, detergents, household, agricultural, medical preparations, and cement) have to take responsibility for recycling such products and packages according to required recycling rates and recycling standards with the roadmap regulated by the Government.

Accordingly, the responsibility to recycle products and packaging will be taken by manufacturers and importers of products including batteries- accumulators, tires, lubricants and packaging (commercial packaging of food, cosmetics, drugs), fertilizer, animal feed, animal medicine, detergent, and commercial cement) will be applied from January 1st, 2024; the manufacturers and importers of electrical and electronic products will carry out their recycling responsibility from January 1st, 2025; the manufacturers and importers of vehicle products will take responsibility for recycling from January 1st, 2027.

Manufacturers and importers could choose one of two options to fulfill their recycling responsibility: (1) do recycling activities by themselves or (2) make financial contributions to the Vietnam Environmental Protection Fund (VEPF) to support the recycling of products and packaging. In case manufacturers and importers choose option No.2, the contribution amount for each type of product and packaging is calculated according to the formula:

F = R x V x Fs

F *is the total amount that manufacturers and importers must pay for each type of product and package (unit: VND).*

R *is the required recycling rate for each type of product and packaging (unit: %).*

V *is the volume of products and packaging produced and imported (unit: kg).*

Fs *is a rational cost of recycling for a unit volume of product or packaging, including costs of sorting, collection, transportation, product recycling, packaging, and management costs. Administrative management to support manufacturers' and importers' recycling responsibility (unit: VND/kg).*

The determination of *Fs* will decide the implementation of manufacturers' responsibilities. The manufacturers must estimate how much they will have to do with their recycling responsibility. It is one of the factors for a manufacturer to consider whether to organize their recycling or pay for the VEPF. So, the determination of this *Fs* is conducted by what principle and by what method?

The principle to determine *Fs*

Fs is an important factor in the EPR mechanism because it derives from two goals of the mechanism.

Firstly, creating a relatively stable financial source corresponding to the number of products and packaging that manufacturers and importers put on the market to conduct or support the collection and recycling of products, packaging, and treatment of waste generated in these activities.

Secondly, it influences the process of design, production, distribution, and consumption to reduce the manufacturer's responsibility through changing product design, changing the use of packaging, using environmentally friendly materials, prolonging product life cycle, easy to collect and recycle. Fs is the factor to promote the above two goals because it will directly create funds to support the collection and recycling of packaging products when manufacturers choose to pay money to the VEPF. At the same time, it will affect the recycling market in shaping or adjusting the cost of recycling in the market. Both the above effects force manufacturers and importers to promote the second goal to reduce the amount of money they must spend to collect and recycle products and packaging.

Therefore, the principle of determining *Fs* is very important to achieve the goals of exterded producer respornsibility (EPR) as well as to ensure the feasibility of the EPR mechanism.

The first principle, in compliance with the regulation on *Fs*, whereby, *Fs* must be a reasonable and valid cost for a unit volume

of product, and packaging, including the cost of sorting, collection, transportation, product recycling, packaging, and administrative costs support the implementation of recycling responsibility of manufacturers and importers. These are the basic costs of sorting, collecting, and recycling packaging products. As for the administrative costs to support the implementation of the recycling responsibility of the importing manufacturer, this is part of the expense that is deducted to serve the management and operation of the EPR system of the National EPR Council, Vietnam EPR Office, and VEPF under the decision of the Prime Minister.

With this principle, *Fs* will tend to be higher than the actual recycling cost of the market due to the administrative costs to be considered. This regulation is intended to enforce the principle of encouraging import manufacturers to organize their recycling (either by themselves, by hiring a recycler, or by authorizing a third party to perform EPR responsibilities) and finally is a way to contribute money to the VEPF.

The second principle: Fs is determined based on the consideration of expense relating to the design and material composition of products and packaging. For products and packaging designed easy to collect and recycle, *Fs* tends to be lower. As mentioned above, the most important goal of EPR is to motivate manufacturers to change their designs towards environmentally friendly products that are easy to collect and recycle, so these factors must be considered when determining the *Fs*, which must be lower than the basic recycling cost of the same product and packaging brought to market. To meet this criterion, some characteristics could be determined such as the use of fewer different materials in the same product or packaging; the ease in distinguishing, classifying, and separating different materials from products and packaging; the color of product, packaging…

The third principle: Fs is determined to ensure feasibility, suitability of production and recycling practices, the development of Vietnam's recycling infrastructure, and in agreement with market principles. This is the orienting principle, ensuring that *Fs* is highly agreed upon by most manufacturers, importers, recyclers, and processors. Because *Fs* not only determines the amount that manufacturers and importers contribute to the VEPF but also greatly affects the price of collection and recycling in the domestic market.

So how to determine *Fs*?

Currently, scientific experts, manufacturers, and importers are discussing to choose a method to determine *Fs,* of which three main methods have emerged:

The first method, determining the basic level of recycling costs and advanced recycling costs is proposed by the Institute of Environmental Science and Technology (INEST), Hanoi University of Science and Technology:

- The basic recycling rational cost is the rationale determined based on the average costs in the collection process and the minimum cost in recycling to achieve the minimum recycling standard specified in column 5. Appendix XXII of Decree No. 08/2022/ND-CP.

The minimum cost in recycling to achieve the minimum recycling standard specified in column 5, Appendix XXII of Decree No. 08/2022/ND-CP is assessed by experts and recyclers as can be determined based on the quantified costs of recycling and the average technology depreciation. However, the cost of collection is problematic because it is highly dependent on transportation costs. With low mandatory recycling rates and available collection materials, the collection distance can be close; but with a high mandatory recycling rate, and the collected materials are distributed far from the central area or the recycling area, the transportation costs will increase accordingly. Therefore, determining the average collection cost will be very difficult. According to INEST's survey, the basic recycling cost for PET materials is from 17,000 VND/kg to 28,000 VND/kg.

- Advanced recycling cost is a recycling cost added to the basic rational cost, this cost is determined by the difficulty level in collection and recycling of the product (such as using a lot of materials, color use, hazardous wastes, size of packaging products, domestic recycling technology has not been met...). This is also a difficult requirement in determining advanced costs because current products and packaging are very abundant in design as well as the use of materials, and especially the design is based on consumer trends which may change frequently, it will be relatively complicated to determine additional costs.

Also, according to INEST's research, the advanced recycling costs applied to products and packaging mainly depend on the degree of convenience in collection and recycling. In France, glass bottles with non-magnetic (non-metallic) caps are subject to a 10% increase in cost; a multi-layer or multi-material packaging is charged an additional 50%, and in the case of products made from non-recyclable materials or opaque PET bottles with more than 4% filler will be charged up to 100%. The manufacturer's recycling cost for colorless PET bottles is EUR 200/ton, while for colored PET bottles, it is EUR 470/ton.

The second method, proposed by the Vietnam Packaging Recycling Organization (PRO Vietnam) and Duy Tân Plastic Recycling Company, is based on the determination of (i) The rationale of collection costs (with relevant variables up to the required recycling rate) plus; (ii) the minimum rationale of recycling cost at the recycling plant:

- Regarding the minimum rationale of cost at the recycling plant, similar to the first method, this is the cost of recycling to achieve the minimum recycling specification specified in column 5, Appendix XXII of Decree No. 08/2022/ND-CP. Duy Tân Plastic Recycling Company gave an example of PET plastic recycling, this recycling cost accounts for more than 30% of the total cost and this cost level is relatively stable and does not fluctuate much (Table 1). Thus, it is possible to determine the cost of recycling at the factory easily and achieve a high consensus from recyclers as well as manufacturers. As for the cost of collection, there will be large fluctuations depending on the distance in the collection. The reason the cost of PET collection in Duy Tân Company's report does not change much is because the current amount of PET scrap is relatively large, which can be collected near the recycling area.

- For a better understanding of the variation in collection costs, let's look at PRO Vietnam's Report on this issue. Accordingly, for each mandatory recycling rate, the cost of recycling will increase in proportion to the increase in the mandatory recycling rate. It can be seen that, with a mandatory recycling rate of 10%, in the first column, the recycling cost of PET is 651 VND/kg, this cost increases in the next columns because the recycling rate increases by 10 % per column, to column 6 with a mandatory recycling rate of 60% (this is hypothetical since the current mandatory recycling rate for PET packaging is 22%) has increased 6 times.

According to the PRO Vietnam Report, the reason is due to the increase in transportation costs in a larger area resulting from the search for materials far from the recycling area. However, it can be calculated how much the collection cost will increase for every 10% increase. For PET, the first 10% of the recycling cost is 651 VND/kg; the next 10%, the recycling cost is 1,303 VND/kg, increasing to 200%; also the next 10% increase by 300% over the first 10%; The next 10% increase by 400% compared to the first 10%…, so it is possible to determine the collection cost based on the rate to be collected to determine relatively accurately the cost of collection (Table 2). This is a method that can be considered to apply, as it will avoid disagreements in determining *Fs* because it is a scientific and practical method.

The third method: Determine the cost of recycling based on revenue and adjustment factor proposed by INEST, this is a method based on the expected profit ratio and revenue of the recycler, according to that, *Fs* still has to take into account the recycling and collection costs and consider the material properties for example *Fs* will be determined based on the sum of the

Table 1. Recycling costs for PET plastic packaging in 2022

2022	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	Ave	Ratio %
Cost of collection, classification and transportation VND/kg	16,000 won	16,000 won	16,500	17,300	17,850	17,950	18,000 won	17,700	16,500	16,500	16,900	17,200	17,033	
Loss rate	33%	32.40%	24.40%	26.60%	23.50%	35.00%	40.40%	42.70%	27.80%	38.60%	34.00%	35.00%	33%	
Total cost of raw materials VND/kg	21.245	21,184	20.526	21,909	22,044	24,238	25.278	25.262	21.094	22.869	22,646	23,220	22,626	66.40%
Recycling cost VND/Kg	9,975	10,500	10,300	9,900	10,700	9,850	10,100	10,250	11,000 won	11,500	10,350	9,000 won	10.285	30.20%
Environmental treatment cost VND/kg	1,000 yen	1,250	1,300	950	1,150	1,050	1,450	1.230	1.140	1.230	980	1.020	1.146	3.40%
Total cost (No profit, interest) VND	32.220	32,934	32.126	32.759	33.894	35.138	36.828	3,742	33.234	35,599	33,976	33.240	34.057	14%
Primary PET plastic VND	28.543	31,360	32,977	31,801	32,267	34.055	29,890	31.115	29.155	27,685	25.480	24.010	29,861	

▲ *Source: Mr. Huỳnh Ngọc Thạch - CEO of Duy Tân Plastic Recycling Company*

Table 2. Packaging recycling cost rationale according to the required recycling rate

Packaging Type \ Required recycling rate	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Carton packaging (VND/kg)	434	869	1.303	1.737	2.172	2.606	3.040	3.475	3,909	4.344
Mixed paper packaging (VND/kg)	1.334	2,669	4,003	5.338	6,672	8,006	9,341	10,675	12,009	13.344
Aluminum packaging (VND/kg)	465	930	1.396	1.861	2.326	2.791	3.256	3,722	4.187	4.652
Packaging of iron and other metals (VND/kg)	536	1.072	1.608	2.144	2,680	3.216	3,752	4.288	4.824	5.359
Hard PET packaging (VND/kg)	651	1.303	1,954	2.605	3.257	3,908	4,560	5.211	5,862	6.514
Hard HDPE, LDPE, PP, PS packing (VND/kg)	886	1,772	2,658	3.544	4,430	5.316	6,202	7,088	7,973	8.859
Hard EPS packaging (VND/kg)	2,000	4,000	6,000	8,000	10,000	12,000	14,000	16,000	18,000	20,000
Rigid PVC packaging (VND/kg)	1,450	2,900	4.351	5.801	7.251	8.701	10.152	11,602	13,052	14.502
Other hard plastic packaging (VND/kg)	1.088	2.176	3,264	4.352	5,440	6.528	7.616	8.704	9,792	10.880
Single packaging of soft materials (VND/kg)	1.116	2.233	3.349	4.466	5.582	6,699	7.815	8,931	10.048	11.164
Soft multi-material packaging (VND/kg)	1.295	2,590	3.885	5.180	6.475	7,770	9.065	10.359	11,654	12,949
Bottles, jars, glass boxes (VND/kg)	593	1.186	1,779	2.372	2,965	3.558	4.151	4,744	5.337	5,930

▲ *Source: Mr. Fausto Tazzy - Vice President of PRO Vietnam*

recycling cost norms of each material contained in the product (Table 3). For example, in bottled water, if the manufacturer declared a way to attract materials, there are 2 types of plastic: PET and PP (because the labeling material is attracted to the cap): PET volume accounts for 80%; PP accounts for 20%: then the Fs of PET will be 80% of the PET recycling rate plus 20% of the PP recycling rate. This method only calculates the cost of recycling in the factory, the calculation of the collection cost will be balanced by the recycler based on determining the balance between profit and cost of recycling in the market to make a decision.

With this method, the most important thing is to determine the expected profit ratio and revenue of the recycler. This will be easily determined according to market principles through quotations or bidding. However, the agreement on the rate of expected profit and revenue will not be fair to recycling facilities with different levels of technology and products.

▲ *Tires are one of the products that manufacturers and importers must be responsible for recovering and recycling*

Table 3. The determination of recycling rational costs based on revenue

Packaging Type / The costs	Material Type				
	Waste PP granules	PE	ABS	PC	POM
Price of recycled plastic pellets, VND/Kg	15,000-18,000	15,000-23,000	35,000-40,000	55,000-60,000	40,000-50,000
Cost of buying raw materials	30%-40%	30%-40%	30%-40%	30%-40%	30%-40%
Electricity costs	10%-15%	10%-15%	10%-15%	10%-15%	10%-15%
Chemical cost	-	-	-	-	-
Other costs	3%	3%	3%	3%	3%
Equipment depreciation	5%	5%	5%	5%	5%
Tax	10%	10%	10%	10%	10%
Labor cost	10%	10%	10%	10%	10%
Shipping costs for purchasing raw materials	40%	40%	40%	40%	40%
Shipping costs for selling products	1-2%	1-2%	1-2%	1-2%	1-2%
Rental cost	10%	10%	10%	10%	10%
Average profit	10 - 15%				
The lowest acceptable profit	3 - 5%				

▲ *Source: Assoc. Prof. Dr. Nguyễn Đức Quảng, Institute of Environmental Science and Technology (IEST), Hanoi University of Science and Technology*

Regardless of the method used, currently, the cost of recycling is still dominated by the cost of collecting scrap, to serve the existing private collection system. This is the difference between Vietnam compared to EPR systems in other countries, especially Europe (EU). In the first stage of implementing the EPR mechanism, the recycling cost norm should still consider the cost structure of scrap collection to ensure the maintenance of the collection system in terms of social security. When the system of waste classification and collection at source is built in localities according to the provisions of the Law, there will be an adjustment related to the waste collection cost of the recycler.

Another main issue is the determination of the transportation cost in the total recycling price. In a certain area, the cost of transporting recycled products and packaging is quite fixed and according to the shipping price bracket of the market. When you want to increase the amount of recycling, you may have to expand the collection area and from there, the transportation cost may be higher. To solve this problem, a second method can be consulted so that a high consensus can be reached from recyclers, collectors, manufacturers, and importers. However, it is also necessary to refer to the advanced recycling cost calculation according to the first calculation method to ensure the goal of EPR as described above ■

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Solutions, policies to encourage investment of the private sector in industrial and urban water treatment in Vietnam

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I. INTRODUCTION

The private sector is an important driving force of the economy, contributing largely to the country's socio-economic development. In 2016, the domestic private sector accounted for 38.6% of GDP (in this proportion, officially registered enterprises accounted for 8.2%, the household business sector accounted for 30.43%). Meanwhile, the foreign private sector (FDI) contributes 18.95% to GDP [1]. With the important position and role of the private economy, the 12th National Congress of the Party has clearly grasped that the development of the private economy is "an important driving force of the economy"... In particular, the 5th Conference of the 12th Party Central Committee issued Resolution No. 10-NQ/TW dated June 3rd, 2017 on developing the private economy to become an important driving force of the socialist oriented market economy. The 13th Party Congress affirmed, strongly developing the private economic sector in terms of quantity, quality and efficiency. Private economic development is an important driver of the economy" [2]. This is a major policy of the Party, both to promote the further development of the private economy, while promoting the role of this economic sector in socio-economic development, strengthening national security in the new situation.

In the field of environmental protection, theory and practical experience show that it is not necessary for the State to be the direct provider of public services to consumers. The World Bank (WB) also affirmed that, in addition to directly providing public services, the State can coordinate with the private sector, the community or other partners to perform the task. In recent years, the Party and State have had many orientations and policies to promote the socialization of environmental protection work. For the field of waste water treatment, the Government has issued many documents, such as: Decree No. 80/2014/ND-CP dated August 6th, 2014 on water drainage and waste water treatment; Decree No. 15/2015/ND-CP dated February 14th, 2015 of the Government on investment in the form of public-private partnership, in which, stipulates for the field of investment in waste water collection and treatment systems. In Decree No. 08/2022/ND-CP dated January 10th, 2022 detailing a number of articles of the Law on Environmental Protection (LEP) in 2020 [3], stipulating policies to encourage environmental services in Article 144, whereby "Investment projects in waste collection, recycling and treatment industries and sectors are eligible for incentives and support as prescribed in Article 141 of the LEP in 2020" and "Provincial-level People's Committees shall prepare, appraise, approve or submit to competent authorities for approval, organize the implementation of approved investment projects by the method of public-private partnership in concentrated domestic waste water collection and treatment, daily-life solid waste in accordance with the Law on Investment in the form of public-private partnership".

Up to now, the results of the implementation of the above policies have significantly improved the investment in the field of water drainage and waste water treatment. Currently, the whole country has about 242 industrial parks that have completed the construction of a centralized waste water treatment system (accounting for 48%), 191 industrial parks have installed automatic monitoring systems (78.9%) and the rest 51 industrial parks are still planning to install automatic monitoring equipment (accounting for 11.1%). In urban areas, most of them have a common drainage system for both surface water and waste water with different sizes, but there is a lack of collection systems and centralized waste water treatment stations [4]. According to a report from the Department of Technical Infrastructure (Ministry of Construction), currently, by the end of 2020, the whole country has about 63 waste water treatment plants concentrated in urban areas of grade IV and above which are put into operation. According to the plan, by 2021, there will be 50 more factories, but the rate of waste water collection and treatment is only about 20%. The policy of socializing the water industry has attracted many businesses and economic sectors to invest in the construction and operation of water supply and waste water treatment works. However, basically, only a small part can be handled, mainly the collection and preliminary treat-

ment activities compared to the needs of the industry, many services require high technology, environmental companies almost always has not been met. Up to now, the treatment capacity to provide environmental services has only met 2 - 3% of urban waste water treatment needs, 15% of solid waste treatment needs, about 14% of hazardous waste treatment needs; many fields such as recycling waste oil, scrap plastic, electrical and electronic waste have not been developed.

II. DIFFICULTIES AND LIMITATIONS IN PROMOTING THE PRIVATE INVESTMENT IN WASTE WATER TREATMENT IN VIETNAM

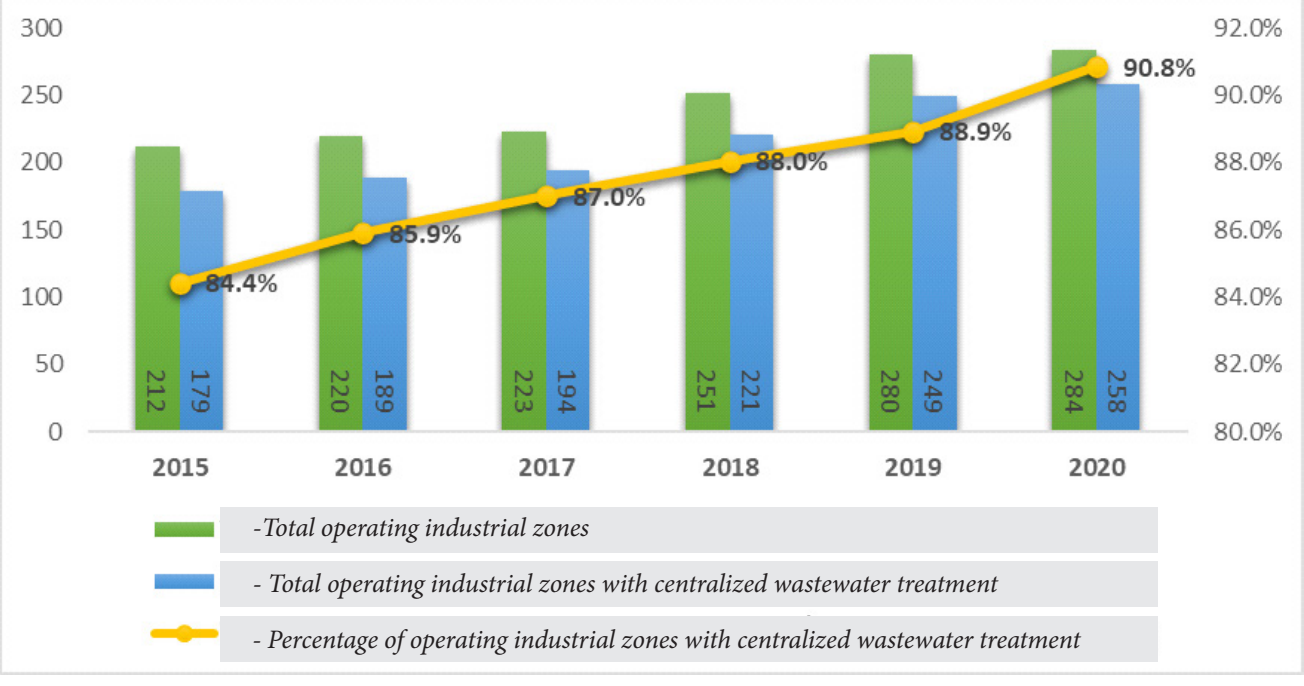
Recently, the number of enterprises in the waste water sector of the country has increased rapidly, specifically, from 132 enterprises in 2010 (of which non-state enterprises accounted for 97.7%) to 476 enterprises in 2020 (of which non-state enterprises accounted for 97.4%). However, this amount is still quite modest compared to the waste water treatment requirements in Vietnam. This is due to the following bottlenecks:

a, Difficulties and limitations in promoting the private sector to invest in industrial park waste water treatment

Firstly, legal regulations, especially the LEP in 2020, although basically consistent with the country's socio-economic development practice, but other relevant laws such as tax law, environmental fees on the principle that "polluters must pay the costs of environmental treatment, remedial, reclamation and restoration", "beneficiaries of environmental values must pay" have not yet promoted their economic tools' role; lack of synchronization to create a legal corridor and a favorable environment to encourage the development of environmental services. Environmental protection and investment in environmental protection are not really considered attractive fields, especially waste water treatment services.

Secondly, the planning and implementation of industrial zones planning is not suitable, putting pressure on environmental protection in general and waste water treatment in particular. In particular, the orientation of industries to attract investment in industrial zones still lacks legal grounds for regulation, carries a kind of "begging and giving" mechanism and depends on the awareness of some localities and businesses, that is not meet the actual requirement. There are areas where a lot of industrial zones are concentrated, which are planned for industries in the List of 17 types that are at risk of causing environmental pollution, such as plating, textile dyeing… Up to now, Vietnam has not yet formed models of supporting industrial zones and providing services. Although Decree No. 82/2018/ND-CP does not stipulate, in fact, there has been a case of merging industrial zones, due to incomplete information when merging, which has led to difficulties in determining the scope of environmental protection work in the area.

Figure 1. Percentage of operating industrial zones with centralized waste water treatment plants meeting regulatory standards



▲ *Source: Compiled from the National State of the Environment Report 2016 - 2020*

Thirdly, reporting and updating information from industrial park investors, Industrial Park Management Boards and localities have not been carried out in accordance with the provisions of Circulars No. 35/2015/TT-BTNMT, Circular No. No. 19/2016/TT-BTNMT and Circular No. 29/2019/TT-BTNMT of the Ministry of Natural Resources and Environment (MONRE) which results in the assessment of environmental quality developments in industrial zones is not complete, accurate and objective. The report of the Ministry of Planning and Investment has not met the requirements of Circular No. 29/2019/TT-BTNMT, according to which, in several years, there is a lack of information and data in industrial zones and industrial zones with annual waste water treatment systemsto the MONRE to review and unify reports to the Government and the National Assembly.

Fourthly, financial resources for investment in environmental protection in general and in environmental protection in industrial zones in particular are still limited. There is no regulation on the use of reserve capital from the central budget, prioritizing arrangements for programs and projects to protect the environment of industrial zones.

Fifthly, the work of disseminating legal policies, guiding enterprises, organizations and individuals to implement the legal provisions on environmental protection is still limited.

b. Difficulties and limitations in promoting private sector investment in urban waste water treatment

Firstly, the investment cost for urban waste water treatment is high because the urban drainage system built over many different periods is not complete and synchronous; The sewer lines are degraded, so the drainage capacity is low, the waste water is almost untreated and discharged directly into the receiving source, many urban areas are under construction, or there is no domestic or waste water treatment station. Preliminary treatment through septic tanks, then along sewer lines and direct discharge into the environment, the proportion of households connected to the urban drainage network in many places is still very low. Many sewer lines are not large enough for drainage; The concreting of canals and ditches also contributes significantly to limiting water drainage. Urban flooding occurs continuously in the Hồ Chí Minh City and Hà Nội when it rains heavily is the clearest evidence for the inadequacies in investment in urban waste water treatment infrastructure today.

Secondly, the incentive mechanism has not created a motivation for private enterprises to invest in the field of waste water treatment. Low cost recovery raises concerns for investments in sewerage and waste water infrastructure networks. This leads to a shortage of investment capital, private enterprises are not interested in these projects, water supply and drainage and waste water treatment are therefore still largely dependent on budget capital.

Thirdly, market conditions (transparency information, stability of policies, policies on partnership and cooperation mechanisms...) for investors to implement business effectively have not been completed. The world trend shows that it is necessary to convert and open some channels to call for private investment, equitize water supply companies, change policies towards socialization, on the principle that polluters must pay and have the effect of regulating behavior, not just to increase revenue.

III. SOME RECOMMENDATIONS ON ENCOURAGING INVESTMENT OF THE PRIVATE SECTOR IN INDUSTRIAL AND URBAN WATER TREATMENT IN VIETNAM

3.1. Continue to improve, supplement and amend regulations related to encouraging private investment in waste water treatment in industrial zones and urban areas

+ Proposing to add the waste water treatment field to the List of industries and professions with special investment incentives and the List of industries with investment incentive.

Currently, Decree No. 31/2021/ ND-CP (issued on March 26th, 2021) details and guides the implementation of a number of articles of the Law on Investment. According to Appendix II, the List of industries with special investment incentives specified in Section A, Part III on environmental protection and infrastructure construction, including: concentrated waste collection, treatment, recycling and reuse; Building and trading infrastructure of industrial zones, export processing zones, high-tech zones, functional zones in economic zones; invest in the development of water plants, power plants, water supply and drainage systems; bridge, road, infrastructure, transport and railway industry; airports, seaports, inland waterway ports; airports, railway stations and other particularly important infrastructure works decided by the Prime Minister; develop public passenger transport in urban areas; invest in the construction, management and business of markets in rural areas; investment, development, operation and management of technical infrastructure works for industrial clusters.

Thus, waste water treatment activities in industrial zones and urban areas have not been included in the list of preferential industries in early 2022 in the field of environmental protection, therefore, it is proposed to add the field of waste water treatment to the list.

+ *Adjustments and supplements to the Law on Environmental Protection Tax in the field of waste water treatment, specifically:* Expand taxable objects to include environmental pollutants (not just goods as at present). This is also consistent with the new regulations in Clause 1, Article 136 of the LEP in 2020, that the environmental protection tax is applied not only to products and goods but also to environmental pollutants. The tax rate should be specified at the maximum or minimum level, the specific level will be based on the actual situation in the locality and the enterprise for regulation.

+ *Additional research on the Law on Water Resources,* specifically: (i) additional research on the provision of transferable emission quotas in the amended Law on Water Resources; (ii) have preferential and supportive policies for organizations and individuals investing in the development of technologies and products related to waste water treatment; (iii) Priority is given to encouraging the private sector to invest in the form of public-private partnership (PPP) in infrastructure development projects for waste water collection and treatment.

+ *Proposing to gradually adjust the environmental protection fee for waste water to suit reality,* in order to improve the responsibility of organizations and individuals for generated waste water. The survey results show that private enterprises evaluate environmental protection fees for waste water as an important management tool.

+ *Proposing to develop and issue guidelines on the process of selecting investors for waste water treatment projects under the public-private partnership (PPP) method to attract private investment.*

Previously, the implementation of PPP in the field of waste water treatment was not much, there were a number of projects implemented under the BT model (build - transfer) that did not meet the actual needs. The BTL model (build - transfer - lease service) is considered to be the most effective model among public - private partnership contracts in the field of waste water treatment and solid waste for the reason of cultural and educational works. Education and welfare include unprofitable waste water facilities, so total project costs are covered through local and Government rental fees instead of usage costs.

By 2020, the Law on Investment in the form of public-private partnership [5] stipulates: "PPP investment is an investment method made on the basis of limited-term cooperation between the State and private investors through the signing and implementation of public-private partnership project contracts in order to attract private investors to participate in public-private partnership projects". The field of environmental protection specified in Article 4 of this Law includes waste water treatment and waste treatment. However, after the Law on Public-private Partnership took effect, for many objective and subjective reasons, the public-private partnership approach in the field of waste water treatment and solid waste treatment has not been implemented much in Vietnam. Therefore, in order to create favorable conditions for investors to apply clean and environmentally friendly technologies in waste water treatment, it is proposed to develop and issue guidelines for the selection process of waste water project investors and mechanisms, policies on credit, service fees, land... to attract private investment.

+ *Completing the planning of water drainage and waste water treatment in industrial zones and urban centers in accordance with the characteristics of each industrial zone and urban area and the zoning of waste discharge*. This is a necessary and prerequisite condition to help investors consider and propose investment projects and technology solutions for implementation. Water drainage and waste water treatment planning must be synchronous, specific and feasible. Information on planning and investment calling procedures should be public and transparent.

+ *Research and propose additional policy solutions to facilitate research, design, manufacture and import of various types of waste water treatment technologies suitable to Vietnam's conditions.*

+ *Continue to improve legal policies related to private investment incentives in the field of waste water treatment,* including:

Concretize regulations on environmental protection's incentives and support for waste water treatment and waste treatment activities in the legal documents under the Law, and at the same time, it is necessary to have specific instructions for investors, including private investors, be confident in making decision on investment.

Incentives and support for environmental protection (Article 141 - Decree No. 08/2021/ND-CP) stipulating that waste water treatment and waste treatment are investment and business activities in environmental protection that are entitled to incentives and support. These regulations need to be concretized in the documents under the Law, and at the same time, there should be specific instructions so that investors, including private investors, feel secure in making investment decisions. Localities need to soon promulgate implementation roadmaps and policies to support on-site collection and treatment of domestic waste water arising from organizations and households in non-concentrated residential areas in accordance with the LEP in 2020. Specifically:

Table 1. Summary of proposed amendments and supplements to encourage investment in industrial and urban waste water treatment

No.	Types of legal documents	Recommendation
1	The Law on Investment	Adding wastewater treatment to the list of preferential industries in early 2022 in the field of environmental protection
2	Regulation on environmental protection tax	- Expanding taxable objects to include environmental pollutants - The tax rate should be specified at the maximum or minimum level; the specific level will be based on the actual situation in the locality and enterprises to determine.
3	The LEP (2020)	- Specifically, detailing incentives and support for wastewater treatment (Article 141). - Service charges for waste water collection and treatment need to be studied and promulgated; - Concretize conditions to support private enterprises to access capital; - Supplementing regulations on access to green bonds issued by the Government and local authorities for infrastructure investment projects and waste water treatment equipment in urban areas and industrial zones (Article 150); - More specifically the principle that polluters must pay; economic tools (Chapter 11) (such as inspection, sanction, reward..);
4	Law on Public-Private Partnership	- Proposing the development and issuance of guidelines on the process of selecting investors for wastewater treatment projects and mechanisms and policies on credit, service fees, land… to attract private sectors to invest
5	Decree No. 08/2022/ ND-CP	- Issuing environmental criteria and certification for wastewater treatment projects that are granted green credits and issuing green bonds (Article 154) - Proposing to include the waste water treatment sector as a priority field in the National Action Plan for the implementation of the circular economy (Article 139).
6	The Law on Water Resources	Additional regulations on transferable discharge quotas. Priority is given to encouraging the private sector to invest in the form of PPP in infrastructure development projects for wastewater collection and treatment.

Tax: Exemption and reduction of corporate revenue, exemption from import tax on equipment of waste water treatment works, exemption and reduction of VAT.

Regarding land: Land allocation, no land use fee collection for enterprises investing in construction of waste water treatment works.

Other incentives: Depending on the characteristics and conditions of each locality, specific policies can be introduced such as when investors invest in the construction of waste water treatment works of provinces and cities, they will be allocated another land area to invest in other fields that are likely to bring economic efficiency and faster return of capital, for example: construction of houses, offices, industrial parks, tourist and entertainment areas...

It is neccessary to add waste water treatment as a specific industry and field that needs to be prioritized to develop a roadmap for implementation and guide the application of the circular economy model. Currently, circular economy has been included in the LEP in 2020 (Article 142) and detailed guidance in Decree No. 08/2022/ND-CP in Articles 138, 139 and 140. Waste water treatment activities are considered as a model which directly contribute to the implementation and application of the circular economy model in product production and waste treatment. In the coming time, MONRE is responsible for formulating the National Action Plan to implement the circular economy, according to which it is necessary to define the tasks and roadmap for implementing the circular economy for sectors and fields, including identify priority sectors and fields for implementation in each period; develop a list of specific industries and fields that must have instructions for applying the circular economy. On that basis, it is proposed to add the waste water treatment field as a specific sector and field that should be prioritized to develop a roadmap for implementation and guide the application of the circular economy model.

+ Proposing to supplement the list of types of wastewater treatment projects with classification criteria and thresholds in the green classification list.

The MONRE is now prepared to submit to the Prime Minister for promulgating the Draft Decision to of regulations on environmental criteria and the certification of projects which are granted green credits and issuance of green bonds. Accordingly, projects or project's items that meet environmental criteria will be granted green credits and issued green bonds. Currently, the Draft "Green Classification List" has mentioned

Table 2. Proposed list of types of waste water investment projects eligible for green credit and green bond issuance

No.	Type of wastewater treatment project	Environmental protection benefits	Screening Criteria	Targets
1	Collecting wastewater in urban areas and concentrated residential areas	Effectively manage water resources and treat wastewater	1. Quality of collection 2. Infrastructure works, collection techniques	1. Meet the requirements on wastewater collection as prescribed by the LEP. 2. Satisfy the requirements for water drainage according to the national technical regulations on construction planning.
2	Treatment in urban areas and concentrated residential areas	Effective management of water resources and wastewater treatment	1. Quality of processing 2. Technology, processing techniques	1. Meet the requirements of wastewater treatment in accordance with the provisions of the LEP, meet the current Vietnamese technical regulations on wastewater. 2. Meet the requirements on technology and techniques for waste water treatment according to the LEP and construction.
3	Collection and treatment of medical waste water	Effective management of water resources and waste water treatment	1. Quality of collection and treatment 2. Technology, processing techniques	1. Meet the requirements on collection and treatment of medical waste water in accordance with the provisions of the LEP and related regulations and meet the current Vietnamese technical regulations on the quality of medical waste water treatment. 2. Meet the requirements on waste treatment technology and techniques according to the LEP and construction.
4	Collection and treatment of wastewater from production, business and service activities	Effective management of water resources and wastewater treatment	1. Quality of collection and treatment 2. Technology, processing techniques	1. Meet the requirements for collection and treatment of wastewater from production, business and service activities in accordance with the LEP and meet the current Vietnamese technical regulations on treatment quality. 2. Meet the requirements on waste treatment technology and techniques according to the LEP and construction.

waste treatment projects, including domestic waste water treatment, industrial waste water treatment, medical waste water treatment. It can be seen that the regulation on green credit and green bonds is necessary, timely and in line with international trends and practices, contributing to creating a legal corridor for the formation and development of the financial product market. In turn, the potential market will contributes to reorienting investment flows and implementing the policy of restructuring the economy towards a green economy and a circular economy.

On that basis, in line with the orientation of building a green classification list, it is proposed to supplement the list of types of waste water treatment projects with classification criteria and thresholds in the green classification list, thereby also promote the private sector to invest in waste water treatment in industrial zones and urban areas when accessing this green capital. In particular, relevant ministries such as the Ministry of Planning and Investment, the Ministry

of Finance, the MONRE and the State Bank of Vietnam need to create favorable conditions for commercial banks and investors of waste water treatment projects in urban areas, industrial parks access to green capital from international financial institutions.

3.2. ***Solutions to improve the efficiency of Law enforcement on wastewater treatment in industrial zones and urban areas***

Enhancing the role of the Industrial Park Management Board in the management of industrial wastewater treatment. Accordingly, it is necessary to assign more authorities to the Industrial Park Management Board in managing the issue of environmental protection of the industrial park and in the treatment of industrial wastewater.

Develop guiding documents for the application of incentives, support and encouragement policies prescribed in the LEP. Organize propaganda and education to raise awareness of production and business establishments in the industrial parks about their rights and responsibilities for wastewater treatment. Emphasis on sanctions if production and business establishments violate regulations on waste water treatment in industrial zones. Forms of propaganda and education include: posting on the bulletin board of the industrial park, radio stations, websites, banners, slogans, etc.

Inspecting and examining the implementation of legal regulations on industrial park waste water treatment. This activity must be carried out on a regular basis, including inspection, pre-announcement and unscheduled inspection and audit.

Transparency of information, simplifying administrative procedures in project registration and bidding. It is necessary to thoroughly grasp the principles of publicity, transparency and objectivity; equality between state-owned enterprises and private enterprises in the process of investor selection in the spirit of the Investment Law 2020, the LEP in 2020, the Amendment of the Bidding Law 2022.

Supporting scientific research, application and technology transfer of waste water treatment in the country. Projects of scientific research, application and transfer of waste water treatment technologies in accordance with the conditions of Vietnam and the trend of the world. It also needs support policies such as those supported by the National Science and Technology Development Fund and the National Fund for Science and Technology Development. The local Science and Technology Development Fund provides funding and is supported with all or part of the costs of technology transfer, purchase of design rights, purchase of software, and human resource training from the Vietnam Environmental Protection Fund's capital and other funds.

Improving the quality of human resources for enterprises, including: Training staff for enterprises through local training sessions; Promote international cooperation in the field of human resource development, prioritize cooperation in training students in environmental technology and engineering at advanced universities, colleges and vocational schools in the region and in the world; effectively attract and use highly qualified people and talented young people to cooperate in research and teaching of environmental goods in Vietnam.

Create favorable conditions for investment projects in the field of environmental protection, investment projects with environmental benefits and especially investment projects in the field of waste water treatment in industrial zones and urban areas, to access resources for environmental protection, green credit and green bonds.

Develop a separate project to clearly define the roadmap, assign responsibilities of Ministries, branches and localities in mobilizing the participation of the private sector in waste water treatment in general, industrial zones and urban areas in particular.

Acknowledgment: *The article is based on the results of the Ministry-level science and technology project "Research and propose solutions and policies to encourage private sector investment in waste water treatment of industrial zones and urban areas", code TNMT.2019.04.06 chaired by Institute of Strategy and Policy for Natural Resources and Environment* ■

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Solid Waste Capacity Index for local governments

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Currently, urban solid waste management (SWM) is one of the significant challenges faced by low- to middle-income countries, an issue that needs to be addressed. Weak capacity in SWM not only causes adverse environmental consequences but also affects the health of the community. In Vietnam, the Law on Environmental Protection (LEP) in 2020 stipulated in Clause 7, Article 72, Sections I and Chapter VI that requires localities be responsible for SWM in their localities, promulgate regulations on waste management and implement preferential and supportive policies for SWM activities in accordance with Law. Therefore, the capacity of SWM at the local level contributes to the sustainable and effective management of solid waste.

The program "Clean City, Blue Ocean" (CCBO) is a key program of the US Agency for International Cooperation, solving solid waste pollution problems and plastic ocean waste. The program is implemented in 10 countries in Asia, the Pacific Ocean, Latin America and the Caribbean: Dominican Republic; Federated States of Micronesia; Fiji; Indonesia; Maldives; Papua New Guinea; Peru; Philippines; Sri Lanka and Vietnam. One of the program's components is to strengthen local SWM systems' capacity. To do this, CCBO has developed a Solid Waste Capacity Index for Local Governments (SCIL), allowing localities to self-assess their current capacity on SWM in association with essential criteria. It is crucial and necessary to build, operate and maintain a sustainable SWM system, helping the locality to identify the current status of SWM and improvements in phased-management activities by performing subsequent assessments. It is an important basis for developing a local SWM plan; in addition, the results of the evaluation also provide important and valuable information for the locality about training needs, as well as the need for policy changes and other related actions.

Solid Waste Capacity Index for local governments (City)

Evaluation Tool

SCIL is a tool developed to assess the capacity of local authorities in implementing 3R (reduce - reuse - recycle)/solid waste system management. During implementation, the current power of local SWM will be identified and a list of issues to be improved is proposed as a basis for developing future implementation plans. Therefore, localities can rely on SCIL's assessment results to strategically invest resources and develop a roadmap to improve their 3R/solid waste system. In particular, the results of this assessment are most meaningful when the locality is implementing the development, updating or review of 3R/SWM plans or strategies.

The SCIL tool is organized in many layers with different levels to become more detailed, designed into components and sub-components help clarify each component that the tool implements, criteria, and questions. The locality completes the questionnaire of each component to get the evaluation score. The tool allows scoring for each component according to the instructions. After determining the score of each component, the overall score of the management capacity of the automatic SWM system is aggregated based on the results of the components. In addition, the tool is designed to be easy, logical and intuitive to use locally, and includes: An Assessment Manual; Introduction to SCIL tools; A set of evaluation and survey questions for each component; Analysis tool (in which tables are built on Excel program). This tool will be published to provide detailed instructions for local governments on how to do this and the process of implementation. When conducting the assessment, the evaluation team reads the entire text of the instructions before implementation. SWM is a complex system with many interconnected components, each of which plays a role in and contributes to the local SWM system. The SCIL tool evaluates the local's SWM system on the basis of

6 components including: (1) Planning component; (2) Policy and legal component; (3) Financial management component; (4) Service provision component; (5) Human resource component; (6) Community connection component.

Planning component

This component aims to evaluate the development of a good and comprehensive master plan for the City's SWM that meets the people's needs, based on two sub-components to evaluate the transparent and complete planning process and the approved long-term, strategic 3R/SWM master plan. Manny criteria need to be developed to determine the above two contents, this component has 9 criteria. Each criterion has a corresponding number of questions. The total number of questions in the planning component is 36.

Policy and legal component

This component is for the purpose of assessing the City's implementation of policy and legal requirements required by higher levels (national and provincial levels), based on 3 sub-components, specifically: (1) an assessment of the city's policies and legislation to support the implementation of 3R/solid waste; (2) Evaluation of performance and monitoring of performance; (3) Evaluation of the practices and responsibilities of stakeholders in the standardized SWM system, this component includes 12 criteria, each criterion will have a corresponding number of questions. The total number of questions in the policy and legal component is 30.

Financial management component

The purpose of this component is to evaluate the systems and processes of management, budgeting and monitoring of costs and revenues of the city's 3R/SWM system, based on three sub-components, namely: (1) Evaluation of if the City has identified and analyzed the financial options for the 3R/solid waste system, the plan to mobilize resources for the system; (2) The City has established a comprehensive budget system for the 3R/solid waste system; (3) The efficiency and transparency of using the budget for the 3R/solid waste system. This component has 7 criteria. Each criterion will have related questions. The total number of questions for this component is 24.

Service delivery component

The purpose of this component is to assess the availability of the City's infrastructure and ways to provide residents with 3R/solid waste services in a reliable, equitable and environmentally friendly manner for all types of solid waste, including recyclable and reusable waste, based on four sub-components, namely: (1) Collection service of all types of waste; (2) Waste collection process and recycling market for materials; (3) Carry out landfilling and treatment of solid waste; (4) Service performance and evaluation. This component's total number of questions is 36, corresponding to 7 criteria.

Components of human resources

The purpose of this component is to evaluate how the City has built effective and fair human resources, organizational structures and processes towards the effective and safe delivery of 3R/solid waste services, based on 4 criteria, specifically: (1) Evaluation of the organization and personnel on 3R/solid waste; (2) Regarding human resource management; (3) Training for officials and employees on 3R/SWM; (4) Regarding occupational safety. This component's total number of questions is 23, corresponding to 8 criteria.

Community connection component

This component was developed to assess the extent to which the City connects with citizens and relevant organizations involved in processes, such as planning/planning, implementation of 3R/SWM activities, continuing receive and incorporate input from the community and stakeholders in the system development and monitoring process, based on two sub-components, namely: Community participation in decision-making on 3R/solid waste, and monitoring activities; Effectively implement the strategies proposed to change the behavior of 3R/solid waste among the people. This component's total number of questions is 28, corresponding to 11 criteria.

In particular, the set of questions is an essential part of the evaluation process. These questions contain the discussion contents and the implementation process of the system. Each question is an evaluation score and the question is formulated in the form of "Yes/No". Each question has a different level of complexity, but the answer is always defined as "Yes" or "Are not". For each yes answer, the evaluator should provide documents corresponding to the content of the questions; as evidence for the answers. The data will be entered into the assessment tool after completing the survey based on the questionnaire of 6 components. This assessment tool is based on Microsoft® Excel software, consisting of sheets and each component corresponds to a worksheet. The scores for each component are automatically aggregated after data entry and accordingly, the aggregate assessment scores are also automatically aggregated.

The purpose and value of the SCIL tool

The purpose of the SCIL tool is to assist cities to self-assess their practical competence in SWM by providing a systematic approach to assessing all six components of the SWM system. The result is an assessment score, providing an overview of the implementation of the current SWM system, identifying the root of significant problems and causes at each component of the system to address them that will provide complete solutions, priority content to be solved in the immediate future and will be solved in the plan. In addition, this evaluation process also enhances coordination, discussion and criticism among members of relevant departments in the City's SWM system, thereby identifying problems. Issues that need improvement fall within the scope and authority of the relevant departments and branches.

The results of this assessment can be used as a basis or combined with the city's existing plan to include the construction contents or the revised content on the city's 3R plan/ SWM. This assessment is expected to be a tool for cities to evaluate SWM system in the area year by year.

Applying the SCIL tool in Viet Nam and its effects

In the implementation plan of the CCBO Program in Vietnam, the SCIL tool is applied and evaluated in 4 cities including: Huế, Đà Nẵng, Phú Quốc and Biên Hòa. Currently, 3 out of 4 cities above have conducted a capacity assessment of the SWM system including: Huế, Đà Nẵng and Phú Quốc.

During the implementation of CCBO, the program has coordinated with the cities to organize a capacity assessment of the SWM system. The total implementation time is from 1 to 3 months; however, this is the entire period when the program has worked with the cities to plan the implementation. The total time to conduct the assessment is about 36 working hours within 1 - 2 months, along with a detailed plan shared with the assessment team members, to help these members proactively arrange the plan for implementation. The program conducts a capacity assessment in Huế City during the period from February - April 2022, Phú Quốc from May - June 2022 and Đà Nẵng City from July - September 2022.

Each city has established a working group/ assessment group, which is representative of the relevant departments of each of the six components mentioned above. The assessment team has 1 team leader, 1 implementation coordinator and at least 6 members participating in the assessment. Each component has at least 1 representative from relevant departments; however, according to the practical situation of each city, this assessment team is appropriately established to ensure a complete and accurate assessment process. In Đà Nẵng City, two units are providing solid waste services for the City, namely Đà Nẵng Urban Environment Company and Hanoi Urban Environment One Member Company Limited, branch in the Central region, therefore, members who implemented evaluation in the service delivery component are representatives from these two units.

All three cities highly recommend the SCIL tool because it's easy to implement, clear and has intuitive results. The issues that need to improve in each city were identified and included in the implementation plan between the CCBO Program and the City. In Huế, the Department of Natural Resources and Environment and Huế City have reviewed and included the contents and criteria of the Assessment Tool so that they can be considered and added to the implementation plan of waste separation at source in the City. While in Đà Nẵng, the Department of Natural Resources and Environment is reviewing the Assessment Tool and is collaborating with the CCBO Program to have a plan to implement the assessment at the district level. The counties will consider some content and criteria of the Evaluation Tool for discussion with service providers in the area to improve further the 3R/solid waste services' delivery in each district. In Phú Quốc, the CCBO Program and the City will apply the approach of the Assessment Tool to develop a draft project on waste separation at the source of the City.

The Program desires to provide cities with tools to evaluate the capacity of SWM systems in their localities as an annual assessment tool, so that localities can determine their capacity and annual SWM system improvements by taking action from the evaluation results ▪

Developing the marine spatial planning: International experience and lessons for Vietnam

National marine spatial planning is a multi-sectoral plan to delineate and arrange reasonable marine space for different sectors and fields based on integrating marine-related sectoral plans. Thereby, it helps to make orientations and establish plans to use marine space and resolve overlaps and conflicts in the exploitation and use of marine resources and space.

Lessons from Norway

Mrs. Hilde Solbakken, Norwegian Ambassador to Việt Nam, shared a lesson from Norway that she thinks it will be the most useful to Việt Nam in compiling the national marine spatial planning. She said Norway's integrated approach to the management of oceans is a triangular process, involving the Government, stakeholders and knowledge.

First, at the Government level, it involves all the Ministries that have responsibilities linked to ocean activities. This includes ministries dealing with fisheries, energy, environment, local affairs, labor issues, justice, defense and foreign affairs. Therefore, a strong political commitment from the Government is crucial.

The second part of the triangle involves all relevant ocean-based industries and other stakeholders: fisheries, aquaculture, petroleum and shipping, but also environmental Non-Governmental Organizations, labor unions and local communities. The Government engages with all these groups in different ways, through meetings or public hearings to seek their comments on draft texts. This helps to ensure that policies and regulations are made in an informed and inclusive manner.

Third, reliable and up-to-date knowledge is crucial about environmental factors as well as developments in ocean-based industries. Ocean-based industries have a vital role to play in creating economic value for Norway. In addition, new industries are emerging - for example, offshore wind power, marine bioprospecting, offshore aquaculture, seabed mineral extraction and carbon storage below the seabed. We need more knowledge and better methods for estimating the cumulative environmental effects of all pressures on marine ecosystems. We also need to know more about the impacts and risks related to climate change and about opportunities for climate change adaptation in marine industries.

Finally, international cooperation and ocean diplomacy play a role in our ocean management practice. Norway is an active advocate for clean and healthy oceans and knowledge-based, sustainable management of ocean resources. We proactively work with our bilateral and multilateral partners to share knowledge and experiences on clean and healthy oceans, marine litter, control of illegal, unregulated and unreported fishing (IUU) and fisheries crime.

National marine spatial planning

The Vietnamese Government issued Resolution No. 22/NQ-CP on July 24th, 2020, approving the task of compiling the national marine spatial planning. Accordingly, the aim of the task is to ensure the effective and sustainable exploitation and use of marine and island resources on the basis of a harmonious combination of socio-economic interests, environmental protection, national defense, foreign affairs as well as international cooperation on coastal lands, islands, archipelagos, territorial waters and airspace that belong to sovereignty, sovereign rights and national jurisdiction of Việt Nam.

National marine spatial planning is a multi-sectoral plan to delineate and arrange reasonable marine space for different sectors and fields based on integrating marine-related sectoral plans. Thereby, it helps to make orientations and establish plans to use marine space and resolve overlaps and conflicts in the exploitation and use of marine resources and space.

The planning will protect and maintain the important structure and function of marine ecosystems. The planning has been developed on the principle of zoning to implement different aims. The zoning of coastal land use is implemented according to the planning of four economic development zones defined under Resolution No.

36/NQ-TW; the national land use planning for the period 2021 - 2030, a vision towards 2050, together with relevant master plans of sectors and localities.

The Ministry of Natural Resources and Environment has been assigned to work with relevant ministries, agencies and localities to compile the national marine spatial planning for the period 2021 - 2030, a vision towards 2045. The Ministry has organized conferences and seminars to consult experts, scientists, managerial agencies and international organizations; relevant Ministries and twenty-eight coastal provinces and cities to complete the contents of the planning.

However, it is believed to be complicated, and is being implemented in Việt Nam for the first time. Thus, the Ministry has made efforts to finish the planning and submit it to the National Assembly for consideration and approval soon.

Some difficulties of the marine spatial planning process in Việt Nam

According to Head of the Việt Nam Administration of Seas and Islands Nguyễn Đức Toàn, Việt Nam has a lot of work to do to complete the national marine spatial planning as the country is still at a relatively early stage in the process of formulating both its coastal zone planning and sustainable management of resources. He said it is necessary to arrange the marine space to avoid conflicts between sectors, while maintaining a balance in economic development and environmental conservation and biodiversity.

Currently, the marine spatial planning process in Việt Nam faces a couple of difficulties, he said. The first is the understanding of marine spatial planning in Việt Nam is still in its infancy, he said. The second difficulty lies in updating data at sea.

Mr. Nguyễn Minh Sơn, a marine expert of the Việt Nam Academy of Science and Technology, who participated in compiling the national marine spatial planning, pointed out some shortcomings in ocean zoning, one of the tasks under the compilation of marine spatial planning in Việt Nam, due to a lack of data. Mr. Nguyễn Minh Sơn said there are only twelve marine protected areas (out of sixteen marine protected areas) that have been established with specific sub-zones. Therefore, specific zoning for marine protected areas cannot be performed for those with unidentified specific sub-zones, he said.

▲ *A corner of Xuân Hải Wharf in Sông Cầu Township in the coastal South-Central Province of Phú Yên*

▲ *Wind turbines at Đông Hải 1 Wind Farm in the coastal Province of Trà Vinh*

Besides, the boundaries of many important marine habitats such as coral reefs and sea-grass beds have not been identified, he said. Many sectoral master plans have not been approved, so the current data integrated into the marine spatial planning might change when the master plans are adopted in the future, he said.

Recommendations

Mr. Nguyễn Minh Sơn said it must clarify designated areas for marine economic development, especially wind power, aquaculture, mineral extraction (sand), oil and gas exploration and production under the national marine spatial planning. The planning determines to encourage offshore wind power development, therefore, it needs to conduct in-depth research to identify criteria and areas for wind power development priority zones, to support the marine use permits for managers and investments orientation for the investors, he said.

Mr. Peter Haugan, Policy Director of Norway's Institute of Marine Research, identified some key factors for good marine spatial planning for Việt Nam, such as being inclusive in the processes, making sure that no significant stakeholders are left out, sharing all relevant ocean data and information in a transparent fashion, and basing the planning on common scientific assessments of cumulative impacts and to revise the plans periodically in order to include new stakeholders, data and knowledge. "With your long coastline, you may want or need to split the management into several regional areas to have local engagement", he said. "If you do so, think about interconnections between the regions, how activities in one region may influence another and secure mechanisms for taking national concerns into account", he added.

UNDP Resident Representative in Việt Nam Ramla Khalidi said marine spatial planning should be seen as a continuous process rather than a single fixed product. "As such, we must not seek to develop a single, perfect and all-encompassing document at this stage", she added.

It is essential that the development and approval of the national marine spatial planning as well as the definition of the sites for offshore wind power development, is done in an open, consultative and inclusive process, she said. Engagement of all stakeholders, especially local communities, will be important, to ensure equitable sharing of benefits and the protection of vulnerable groups, she said ■

PHƯƠNG LINH

(Source: Vietnamnews.vn)

VinFast's electric vehicles play a crucial role in reducing emissions and protecting the environment

VinFast's electric vehicles are making a significant contribution to transforming transportation in Vietnam, offering a new and appealing outlook for the country's tourism industry by aligning with "green" and sustainable trends. In terms of tourism, VinFast plays a crucial role in reducing emissions and protecting the environment through its pioneering production of clean energy vehicles. The company aims to create a sustainable future for Vietnam. VinFast provides both electric motorcycles and electric cars to meet personal transportation needs. Additionally, VinFast offers electric buses for public transport, establishing a green, modern and civilized mobility ecosystem. The widespread network of tens of thousands of VinFast car and electric motorcycle charging stations across Vietnam ensures the convenience of a green "future" for the people.

Currently, VinFast's electric motorcycle lineup consists of 8 models, the latest being the Vento, catering to a wide range of customers, from students to commuters, with various price options suitable for different income levels in Vietnam. This product line is gradually replacing gasoline motorcycles in major cities, exemplifying the prevalence of smart and community-responsible consumer trends.

Furthermore, electric buses are gaining popularity in the community, completely changing the perception of buses that were once seen as cumbersome. Many tourists prefer electric buses over traditional ones due to better services, smoother operations, and spacious interiors. The convenience and positive impact on the community have contributed significantly to VinFast's rapid success nationwide. Despite its success with gasoline models, VinFast has decided to cease production of gasoline vehicles by the end of 2022 to focus its efforts and resources on creating an electric mobility ecosystem, not only for Vietnam but also for the world.

▲ *The VinFast electric motor line - Vento*

The VF e34 marked the beginning of VinFast's era of pure electric vehicles. This C-size SUV, equipped with numerous smart features, has been delivered to numerous customers across Vietnam, earning the nickname "the seismic storm". With 25,000 orders in just 3 months, the VF e34 represents VinFast's initial success and showcases the positive reception and willingness of Vietnamese consumers to embrace positive change.

Notably, the presence of the VF e34 on tourist routes demonstrates that electric cars can fulfill all user needs and will eventually replace internal combustion engine cars completely in the near future. VinFast's electric vehicle lineup spans across all five segments, from A to E. Two models, VF 8 and VF 9, have been globally available since January 2022 and have received a positive response from foreign customers, with over 40,000 orders in just over a month.

To achieve such remarkable progress in a short period, VinFast has partnered with leading companies such as ZF, Nvidia, Applus IDIADA, HERE, Cerence, Gotion High-Tech, Bosch, among others, aiming to incorporate the best technologies when manufacturing its products. In terms of production, in addition to the 335-hectare complex in Hải Phòng, Vingroup, VinFast's parent Company, recently built a massive battery factory in Hà Tĩnh with an annual capacity of producing 100,000 battery packs. Furthermore, VinFast plans to establish an electric vehicle factory in the United States, set to commence operations by the end of 2024.

According to travel agencies, the international market's embrace of VinFast's "miracle" holds great significance in promoting Vietnam's image as a green and dynamic country that is keeping pace with global trends.

"In addition to our traditional cultural specialties, we can now proudly introduce visitors to a new source of pride for Vietnam: VinFast. VinFast serves as a special travel ambassador for our beloved country. In the eyes of our international friends, Vietnam is not only a beautiful and charming destination but also a true green tourism paradise, an essential location on the world tourism map," affirmed a representative of a travel business ▪

NHÂM HIỀN

환경부
Ministry of Environment

KEITI
한국환경산업기술원
Korea Environmental Industry & Technology Institute

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:

■ Promote and enhance the cooperative activities in the field of environment between Vietnam and Korea;

■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.

For more information about our activities, please refer to:
Website: www.keiti.re.kr
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