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Environment

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ENVIRONMENT IS NOT TO BE TRADED OFF FOR ECONOMIC BENEFITS

Enhancing conservation of endangered wildlife in Việt Nam

Environmental ethics - From thought to action

Treatment technology of domestic solid wastes for rural areas in Việt Nam

VIETNAM ENVIRONMENT ADMINISTRATION
CENTRE FOR ENVIRONMENTAL CONSULTANCY AND TECHNOLOGY

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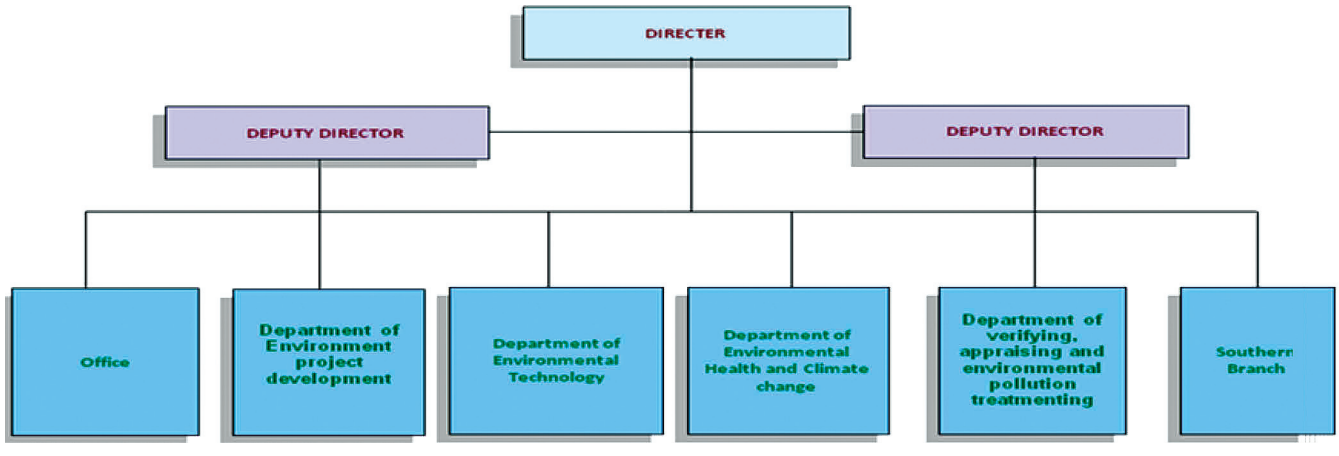
* Centre for Environmental consultancy and Technology (CECT), under the Vietnam Environment Administration (VEA) is business units of public services in the Ministry of Natural Resources and Environment is consulting function issues related to the environmental field; research, receive and process technology transfer of environmental pollution on a national scale.
* Functions and duties regulated by the Decision No.1504/QĐ-TCMT on 25th November 2014 of Director General of VEA.
* ORGANIZATIONAL STRUCTURE



Personnel working for the environmental projects consist of doctors, masters, engineers, bachelors and supporters including professors and leading experts in the fields such as: environmental management, environmental technology, water supply, construction, architecture, environmental health, electronics and cybernetics …

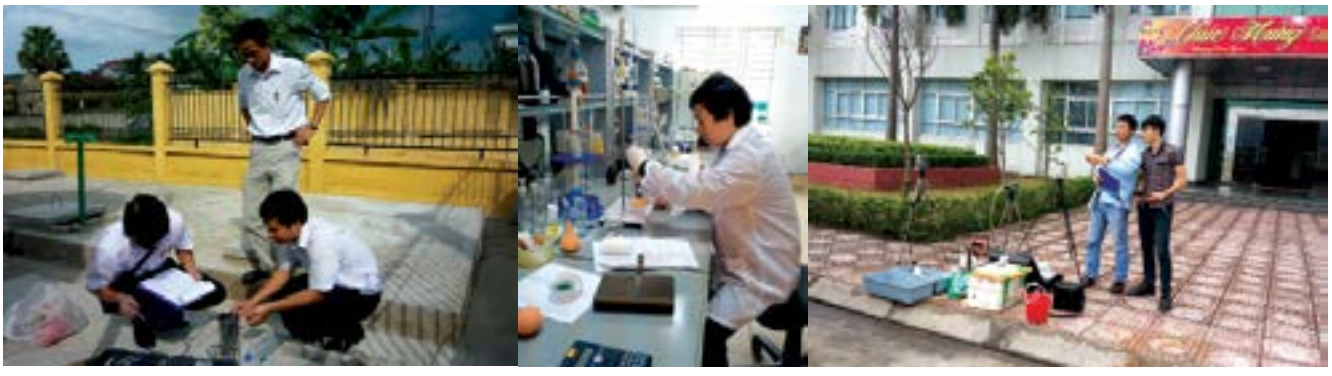
* The field of main actions

1. Research, applications and technology transfer of environmental pollution treatment…

2. Investigation, examination and assessment of the environmental status…

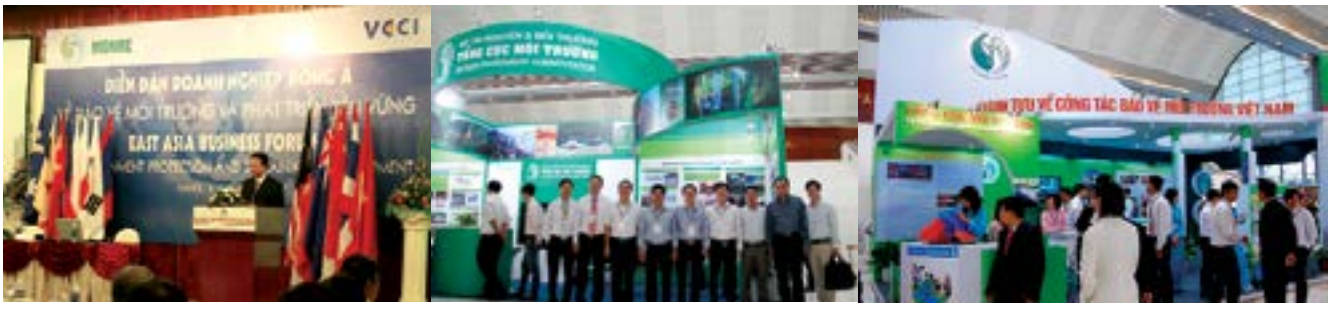
3. Reports of environmental impact assessment, confirmation of the completion of the environmental protection work, planning environmental protection and development of environmental protection schemes…

4. Monitoring, supervision and analysis of environmental parameters…



5. Organization of environmental events and exhibition…

- To organize the East Asia Business Forum
- To organize the International Exhibition on Environmental Technology at the 3rd Nationnal Environmental Conference in 2010 and the 4th in 2015
- To host Vietnam's booth at the Pollutec Exhibition (Lyon Eurexpo France) in 2016.



6. International cooperation acitivities

- The ODA technical support project "Capacity strengthening of groundwater resources planning and investigation in urban areas of Vietnam - IGPVN" funded by Government of Germany;
- The cooperation project with Geological Survey of Finland "Development and implementation of adaptation measures to climate change in coastal regions in Vietnam - VIETADAP";
- Signing of cooperation, exchange of research, staff exchange, capacity building, development and technology transfer (Nagaoka, Fflinders, NIVUS, APO ...);
- Host and coordinate to organize workshops (VACI, WWD, ..) and international training courses (BGR, GIZ, Flinders …);
- Participate in the prestigious national, regional and international fora (SIWW, AwHOT, GWP, CCOP...)

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CONTENTS

LAW & POLICY

VIEW EXCHANGE

GREEN SOLUTION & TECHNOLOGY

GREEN COOPERATION

GREEN DEVELOPMENT

NATURE & ENVIRONMENT

NATIONAL ONLINE CONFERENCE ON ENVIRONMENTAL PROTECTION

Environment is not to be traded off for economic benefits

At the national online Conference on environmental protection, taking place on 24th August,2016, Việt Nam's Prime Minister Nguyễn Xuân Phúc said that it was necessary to change our thinking in environmental protection, considering environment as a mean to speed up sustainable development.

▲ *Prime Minister Nguyễn Xuân Phúc speaking at the Conference*

GAPS REMAIN

Prime Minister acknowledged that although the Government of Việt Nam has been giving strong directions to tackle environmental issues, however, until now specific solutions at both central and local levels have not been found out.

Prime Minister Nguyễn Xuân Phúc pointed out some big gaps in current environmental management. For example, environmental pollution is taking place in wide area, not in a specific area. Many complaints regarding environmental pollution made by a large number of people have been taking place in many locations. Today's blast of environmental pollution is caused by accumulations in the past, over many years and during development process.

Minister of Natural Resources and Environment Trần Hồng Hà said that environmental protection in Việt Nam is facing with tremendous pressure from national socio-economic development. Each year, there are more than 2,000 investment projects that need to conduct environmental impact assessment in accordance with applicable laws.

The biggest environmental concerns are now happening in industrial development areas. Minister Trần Hồng Hà added that currently out of 615 industrial clusters, only 5% of them are provided with centralized wastewater treatment systems, while the rest are not and discharging wastewater directly into the environment.

BE CAREFUL WITH INVESTMENT ATTRACTION AT ALL COST

Minister Trần Hồng Hà pointed out some of current and future environmental threats. These threats are closely linked with economic development, investment attraction and scaling up of investment projects.

According to Minister Trần Hồng Hà, we should pay attention to the regime of calling for foreign direct investment at all cost, which can result in the trade off by serious environmental pollution. Due to the past attention to call for FDI, Việt Nam tends to loosen environmental protection standards in order to give better competitiveness than other countries in attracting foreign investments. In reality, some FDI enterprises have caused serious environmental pollution, namely Vedan, Miwon and Formosa, whose wastewater has caused sea environment pollution in 4 Central coastal provinces of Việt Nam, and Vĩnh Tân 2 thermal power plant which has caused smog and dust pollution...

Currently, FDI flows tend to move into sectors that consume a lot of energy, resources, human resources and are environmentally - unfriendly, such as metallurgy, ship building industry, garment and textiles, footwear, mineral exploitation and making use without linkage with specialized processing, pulp industry, chemical production, and food and farm product processing... All these fail to attract advanced and source technologies and technological transfer. Many enterprises even accept fines when they are found to cause environmental pollution and after that convict the same act of causing environmental pollution again.

In addition, foreign investors have taken advantage of the gaps in Vietnamese technical specifications/standards to bring in obsolete technologies, which overuses resources, energy and manpower in order to maximize their profit.

The Minister also warned that there are more and more big projects which have been

issued with investment licenses but still lack of proper planning and assessment of potential environmental impacts. Environmental pollution prevention, control and response by investment projects have not received appropriate attention.

COMPREHENSIVE SOLUTIONS ARE NOW NEEDED

"The 4th industrial revolution is coming into shape very soon. If Việt Nam is slow in to act, the country may become a dump field for brow, obsolete and polluting technologies of the world", stressed Minister of Natural Resources and Environment Trần Hồng Hà.

In order to improve the situation, the Head of Natural Resources and Environment sector believed that it is necessary to focus on some key solutions. These include tightening of technical specifications, standards, environmental technical barriers; encouragement of advanced and clean technologies; streamlining of legal and institutional framework; and enhanced capacity of human resources...

For the long run, the Ministry of Natural Resources and Environment suggests that a ranking of environmental protection performance by localities should be established and implemented since 2017 and increased budget spending for such activity.

The Ministry also proposes that the National Assembly would supervise environmental protection performance of big investment projects which are approved by the National Assembly and Prime Minister and then assigned to provincial people's councils to follow up with implementation.

CHÂU LONG

NATIONAL STATE OF ENVIRONMENTAL REPORT 2011 - 2016 RELEASED

Lately, in Hà Nội, Deputy Minister of Natural Resources and Environment Võ Tuấn Nhân chaired the Launching Ceremony of Vietnam's National State of the Environmental Report period 2011 - 2016. The Report consists of 10 chapters including the issues related to development activities, and socio-economic pressures on the environment; issues related to climate change; situation of solid waste, problem in waste collection, transportation and processing; analyzing environmental changes in quality of water (surface water, groundwater, seawater), air and soil… The Report found out shortcomings and difficulties in environmental protection, such as: awareness, responsibility of the industries, businesses and citizens. The inadequate legal system and regulations on screening and selecting investment projects, production technology, environmental remediation, controls the waste discharge of the business take effects. Moreover, the management capacity is limited, along with weak sanctions is weak and inadequate technical equipment and technology.

Environmental quality in some places continues to decline. Pressure from socio-economic development and climate change and natural disasters have been increasing new pressure on environment, affecting the people's health. At traffic intersections, construction sites, construction areas, air pollution tend to increase, especially in big urban areas. Pollution and degradation of water quality continues to occur in the middle and downstream (especially in the areas the water flows through urban areas, industrial zones, craft villages).

However, the Report also confirmed that in comparison to the previous period, the work of environmental protection in the period 2011 - 2015 has gained many positive changes. That the legal system has been strengthened is marked by the Law on Environmental Protection 2014 which was passed in 2014. Based on analysis of the Report in the period 2011 - 2015 and direction and orientation of the Việt Nam's National Assembly and the Government, the Report proposes to complete the legal system on environment. In the long term, environmental protection legislation should be studied to perfect environmental laws. Also, measures to enhance state management on environment at local and central levels should be taken into consideration.

NAM VIỆT

SEAFOOD SAFE NEAR SURFACE IN CENTRAL PROVINCES OF VIỆT NAM

According to a joint ministerial study, months after the Formosa Company toxic spill, many types of seafood bred at fishing farms in the four Central provinces affected by the incident or caught within 20 nautical miles of the shore are now deemed safe for consumption. The seafood deemed safe includes tuna, mackerel, pompano, snapper, herring, and anchovy.

At a press Conference, in Hà Nội, in September, 2016, leaders of the Ministries: Health, Natural Resources and Environment, Agriculture and Rural Development provided detailed information about sea environmental safety, seafood exploitation and seafood consumption in the four Central provinces of Hà Tĩnh, Quảng Bình, Quảng Trị and Thừa Thiên-Huế.

The results of study showed no presence of cyanide or phenol (toxic chemicals which, in combination with iron hydroxide, created a compound with a density heavier than seawater and caused the mass fish death) in samples of most types of seafood taken in the four central provinces and three other randomly-selected provinces. Additionally, marine products bred at fishing ponds in the four Central provinces are also safe.

However, the Health Ministry warned several kinds of seafood, mostly bottom feeders, such as crab, shrimp, crayfish, snails, squid, rays, perch, octopus caught within 13.5 nautical miles are still unsafe for human consumption. Among 1,040 samples of seafood in four provinces, 132 samples were detected with phenol, including crab, shrimp, tôm tít (mantis shrimp, or stomatopod, is a type of marine crustacean of around 10cm in length), snails, squid, octopus, stone crabs.

To ensure the health of consumers, the Health Ministry asked people not to use seafood caught from waters within 20 nautical miles. The Health Ministry will co-ordinate with the Ministry of Agriculture and Rural Development to inspect periodically seafood caught offshore and aquaculture at the four Central provinces.

At the meeting, the Ministry of Natural Resources and Environment said contamination levels at Hưng Nghiệp Formosa Hà Tĩnh Steel Co. Ltd dircharge sites - monitoring of natural cleaning mechanisms and pollutant concentration - decreased over time. The quality of sea water measured at all automatic environmental monitoring stations met up to Ministry regulations, including standards for beach safety, underwater sports, aquaculture and aquatic conservation. Reef ecosystems, seagrass and fishery resources were all seriously affected by the Hưng Nghiệp Formosa Hà Tĩnh Steel Co. Ltd incident, but they've started to show positive signs of recovery.

HOÀNG LONG

The Prime Minister's Directive on a series of urgent tasks and solutions on environmental protection

Việt Nam's Prime Minister Nguyễn Xuân Phúc promulgated Directive No. 25/CT-TTg on a series of urgent tasks and solutions on environmental protection which request that environmental protection must be a regular task in national development; and a common responsibility of the whole political system, business community, and people. According to this Directive, investment attraction must take into consideration of environmental protection and avoid outdated technologies.

The Prime Minister assigned the Ministry of Natural Resources and Environment (MONRE) to work with the Ministry of Justice and relevant agencies to propose and amend regulations and laws on environmental protection, natural resources, tax, budget, investment, construction, science, technology, and energy in 2017. The MONRE, the Ministry of Planning and Investment (MPI), the Ministry of Science and Technology were asked to build a new system of environmental criteria on production and technical attraction for investment attraction and ratification.

The Government Chief assigned Ministries, agencies, and localities to review and prevent projects which apply backward technologies and are vulnerable to environmental protection. In addition, the MONRE was asked to investigate subjects with over 200 m^3 of waste discharging daily nationwide; assess environmental impacts and environmental protection measures at large-scale projects which are vulnerable to environmental pollution in 2017. Simultaneously, the Ministry was requested to work with relevant Ministries and local authorities to conduct general investigations to evaluate and classify sources of waste discharging; build a national database on waste in 2018.

PHẠM ĐÌNH

Enhancing conservation of endangered wildlife in Việt Nam

Dr. HOÀNG THỊ THANH NHÀN
MSc. NGUYỄN THỊ VÂN ANH
Biodiversity Conservation Agency
Vietnam Environment Administration

Việt Nam is recognized as a country having high biodiversity with approximate 7,500 microorganisms; 20,000 terrestrial and aquatic higher plants; 10,500 terrestrial animals; 1,000 freshwater fish species; in marine areas, there are more than 7,000 invertebrate animals, 2,500 fish species and 50 marine snake, turtle and mammal species. However, in recent years, the biodiversity of Việt Nam is degrading due to pressures of climate change and human activities such as landscape fragmentation and reduction, forest destruction, environmental pollution, hunting, destructive exploitation and illegal and unsustainable trading of wildlife. Therefore, enhancing conservation of endangered wildlife is one of key tasks in biodiversity conservation.

STATUS OF BIODIVERSITY CONSERVATION

In recent years, the conservation of wildlife has achieved significant outcomes such as increase in rehabilitation area of ecosystems; new discovery of species having scientific and conservation significance in order to restore and develop rare and precious genetic resources. By now, Việt Nam has 164 forest protected areas, marine conservation areas and inland water protected areas with the total area of 2.2 million hectares which are critical habitats for rare, precious, and endangered wildlife species. Recently, Việt Nam has discovered more than 500 grey-shanked douc langurs in Kon Tum and more than 200 Phayre's leaf monkeys in Thanh Hóa.

However, according to statistics, the number of species and the population of wildlife species in Việt Nam are reducing considerably; many rare, precious, and endangered species in Việt Nam have high extinction danger. According to the Red Book of the International Union for Conservation of Nature (IUCN), there were only 25 fauna species listed as endangered (EN) in Việt Nam in 1996, until September 2016, the figure has increased to 110. The total number of wildlife flora and fauna species in the Vietnam Red Book (2007) was 882, of which the number of rare fauna species increased from 365 (in 1992) to 418 (in 2007), the number of rare flora species increased from 356 (in 1996) to 464 (in 2007), of which 116 species are extremely endangered and 9 species moved from different endangered categories (in 2004) to the extinction-like level (of these 9 species are Sumatran rhinoceros, kouprey, tapir, otter civet, saltwater crocodile, and sika deer). The population of important species have reduced to the critical level, particularly large mammals and some primates (tiger, elephant, gibbons, langurs, Sao la..). Some flora species were previously categorised as nearly endangered but now are classified into extremely endangered such as hoàng đàn *(Cupressus torulosa)*, bách vàng *(Xanthocyparis Vietnamese)*, sâm vũ diệp *(Panax bipinnatifidus)*, tam thất *(Panax pseudoginseng)*... This also happens to marine species; many high economic value fish species and marine biological resources are degrading seriously. According to Decree No. 160/2013/ND-CP of the Government dated 12/11/2013, currently, Việt Nam has 83 fauna species and 17 flora species that are classified as endangered that need prioritized protection.

There are many reasons causing reduction in the number of species and the population of wild species; however, illegal exploitation, trading and consumption of wildlife have increased significantly in recent years and are considered as main causes of remarkable reduction in species population in the wild. The illegal trading and consumption of wild fauna and flora species take place globally with annual earnings of about 5 - 20 billion USD; they are supplied to the market to be used as medicine, food, pets, decorations... which turn many endangered species to extinction in the world.

Some studies showed that Việt Nam is becoming a consumption market and a stopover of endangered wild fauna species such as tiger, bear, pangolin, freshwater turtle, snake and monitor lizard originated from other Asian countries; while products like rhino horns and hoofed animal horns originated from Africa are also sold to domestic consumers. Recently, about 200 wild animal species, including 80 rare species are being traded and consumed in the Việt Nam's market. These species are mostly illegally exploited; it is estimated that there are about 4,000 - 5,000 tonnes of wild animal to be illegally transported to China every year, of which mostly are primates, bear, pangolin, turtle, snake, elephant horn, rhino

horn and finished products and derivatives of wild fauna species.

According statistics of the Forest Protection Department, from 2010 to August, 2016, forest rangers discovered and handled 174,385 legal violation cases nationwide on forest management, development and protection and forest product management. Of which, the number of violation cases relating to wild fauna species management is 4,305, thousands of kg of wild fauna products and 60,217 wild animals of all types are confiscated, of which 3,418 animals are endangered and rare.

▲ *Illegal wild fauna species and goods seized by authorities*

EFFORTS IN CONSERVATION OF ENDANGERED SPECIES

In order to conserve endangered species and to address illegal hunting, trading and consumption, in addition to obligatory tools and international agreements that Việt Nam is a party to such as the Convention on Biological Diversity (CBD), Convention on Wetlands of International Importance (RAMSAR), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITIES), Việt Nam has participated in many international and regional initiatives and commitments such as the Association of Southeast Asia Nations' Wildlife Enforcement Network (ASEAN-WEN); London, Kasane Statement on the Illegal Wildlife; Statements of the East Asia Summit and the Asian Pacific Economic Forum (APEC) Summit on promoting efforts in cooperation to prevent illegal trade and reduce consumption demand of wildlife.

Việt Nam also promotes bilateral and multilateral cooperation with many countries in the world such as signing the Memorandum of Understanding on prevention of rhino horn trade with South Africa (2012); Việt Nam - the US joint statement, of which wild fauna crime is considered as a serious crime; the Trans Pacific Partnership Agreement (TPP) among 12 countries, has a Chapter on Environment which regulates that member countries commit to adequately implement CITES and implement appropriate measures to prevent illegal trade of wildlife.

In addition, Việt Nam has gradually legalized and improved the legislations on biodiversity conservation and protection of wildlife. With the improvement of legislations on forest development and fishery, the Law on Biodiversity 2008 is the highest legal document, regulating comprehensively on conservation and sustainable development of biological species, endangered species... Furthermore, Decree No. 160/2013/ND-CP of the Government dated 12/11/2013 on criteria for species identification and management in the list of rare and endangered species prioritized for protection and many other documents on planning, strategies, action plans, and circulars which are also promulgated for enforcement of conservation of biodiversity and endangered species.

To enhance conservation and to control illegal hunting and trading of wildlife, on 20th February, 2014, the Prime Minister has promulgated Circular No. 03/CT-TTg on enhancing instructions and implementing measures for control and conservation of rare and endangered wild fauna species, which request Ministries, sectors and Central city's and provincial people committees to comprehensively implement nine solutions to prevent illegal violation behaviors of international and domestic regulations relating to rare and endangered wild fauna species. Recently, the Prime Minister promulgated Circular No. 28/CT-TTg dated 17/9/2016 on some urgent solutions to prevent and control harm behaviors on wild fauna species. It encourages the mass media to enhance communication of good examples on conservation and control of wild fauna trade; discover and strongly criticize behaviors and actions in contradiction of the legislations of Việt Nam and international conventions on conservation of rare and endangered wild fauna and flora species.

CHALLENGES IN CONSERVATION OF ENDANGERED SPECIES

The system of policies and legislations on biodiversity conservation in general and species conservation in particular is not holistic. There is overlapping in mandate and management responsibility between the Ministry of Agriculture and Rural Development and the Ministry of Natural Resources and Environment in protecting wildlife, particularly rare and endangered species. Therefore, the development of guiding documents of the Law on Biodiversity 2008 has not reached consensus, which lead to late promulgation of guiding documents on species management and conservation. In addition, resources investing on species conservation are very limited, species conservation programs are not properly paid attention to. In protected areas, illegal exploitation of wild fauna species still occur due to conflicts between poverty, development and conservation.

The overexploitation and overuse of wild fauna and flora resources due to population growth cause pressures on endangered species conservation. In addition, deforestation and the conversion of forest into cultivation land, mineral extraction, infrastructure development, hydropower... also result in losses in habitats, for which the conflict between human and species in the wild is increasingly intensified. The increasing illegal and unsustainable consumption demand of endangered wild species for food, liquor, traditional medicine, pets, decorations and species dishes... makes the illegal wildlife trade activity become as serious as human trafficking and drug trade.

Awareness of the whole society on species conservation and biodiversity conservation is limited; a proportion of local people still have the habits of using endangered wild fauna species, which promotes wildlife hunting, trade and consumption and this has become an urgent and pressing issue in the society; awareness of authorities and sectors have been enhanced but not enough and effective to conserve rare and endangered species in an effective and comprehensive manner.

SOME SOLUTIONS TO ENHANCE BIODIVERSITY CONSERVATION

Improving policies and legislations and managing data to protect endangered species: Reviewing and revising the legal framework and policies on wild fauna and flora species, gradually removing overlapping and inconsistency among legal documents; creating sustainable livelihoods and guiding and encouraging communities living in the buffer zone to participate in protection and conservation of rare and endangered species; developing and implementing programs on conservation of endangered species that are prioritized for protection; managing biodiversity conservation entities to conserve genetic resources and restore populations of endangered species; developing mechanisms to ensure financial support for biodiversity conservation and species conservation.

Enhancing resources and capacity for effective management and enforcement of in situ and ex situ conservation of endangered species: Promoting training and education activities, formulating communication materials, enhancing enforcement and compliance of legislations on conservation management, strengthening skills on investigation and handling of serious criminals relating to wildlife; developing inter-sectoral cooperation mechanism, strengthening information exchange and participation and collaboration in conservation activities and enforcement activities.

Developing and expanding partnership relationships and scopes, institutionalizing campaigns on behavior change, reducing consumption demands of endangered species: Enhancing partnership relationships (among governmental agencies, non-governmental agencies, private sector, enterprises and socio - political organizations) to promote the collaboration and participation of different stakeholders in the society to build awareness and understanding of the whole society on endangered species conservation; promoting propaganda and dissemination of legal documents on wild fauna species protection to communities, particularly publishing information of violation cases of endangered species in the mass media to increase the deterrence and to prevent the violations; studying and propagating products replacing products that are originated from endangered wild fauna species...

Enhancing research and technology transfer on species conservation: Studying and promoting technology transfer on species rescue and release of species back to the wild, species inspection and identification; Investing in habitat conservation, monitoring and supervising species through the application of advanced tools.

Enhancing international cooperation in species conservation: Mobilizing resources (financial, technical and institutional) in order to implement international agreements and commitments and national legislations on wild species through regional and global cooperation mechanisms■

Enhancing policies to support and promote environmental protection of river basin water

HÀN TRẦN VIỆT - TRẦN BÍCH HỒNG
Institute of Environmental Science
Vietnam Environment Administration

In recent years, socio-economic development activities in river basins have taken place dynamically, which contribute to the overall development of Việt Nam. However, this development has caused many negative impacts on the environment, including the water environment in river basins. Currently, the water environment in river basins is degrading in many areas, particularly in sections flowing through urban areas, industrial zones, craft villages and downstream areas.

Therefore, the management of river basin water environment has been paid attention by the Việt Nam's Party and the State, with timely promulgation of regulations on environmental protection in general and policies to support and promote environmental protection of the river basin water in particular, such as the Law on Environmental Protection (LEP) 2014, Decree No. 19/2015/ND-CP regulating some articles of the LEP, Decision No. 166/QD-TTg promulgating the National Strategy on environmental protection to 2020, vision to 2030, Decision No. 1206/QD-TTg approving the National Target Program on pollution mitigation and environmental improvement in the period 2012 - 2015, Decision No. 129/2009/QD-TTg approving the Scheme "Mechanism and policy to promote investments in environmental protection", Circular No. 212/2015/TT-BTC guiding enterprise income tax policy on environmental protection based on Decree No. 19/2015/ND-CP…

For environmental protection and pollution mitigation of manufacturing and commercial activities, the State provides a proportion of financial support for enterprises operating in river basins, specifically in Clause C, Part 1, Decision No. 174/QD-TTg regulating: "Enterprises operating in river basins have to protect the environment and to mitigate environmental pollution from the manufacturing and commercial processes. The State provides a proportion of financial support to implement these tasks in the form of targeted support for each task, each project"; Clause C, Part 2, Decision No. 197/2008/QD-TTg regulates: "Enterprises, industrial zones, processing zones, and high technology zones operating in the Đồng Nai river system must implement waste treatment before discharging and emitting to the environment or implement pollution treatment as regulated".

Projects on construction of environmental protection infrastructure of industrial zones, industrial units and craft villages in river basins receive supports on infrastructure construction investment according to Article 39, Decree No. 19/2015/ND-CP. Accordingly, the State prioritises to allocate land associated with available works, technical infrastructure items (transport road, electricity, water sewage, communication information, energy) outside the project area connected with

▲ *Youths in Tân An ward (Quảng Ninh province) participated in cleaning Bến Giang river area*

the overall technical infrastructure of the region. If the State is unable to allocate the land, the project investor receives support to invest in constructing the infrastructure outside the border of the industrial zone, processing zone, high technology zone according to investment regulations.

Serious environmental polluters located in river basins which are in the removal list receives concession policies on land according to Article 41, Decree No. /2015/ND-CP. Particularly, investment projects in the priority list of the Cầu river basin Environmental Protection Scheme; Đồng Nai river basin Environmental Protection Scheme; Nhuệ - Đáy river basin Environmental Protection Scheme are prioritised to get loans from the Việt Nam Environmental Protection Fund and other credit funds.

On the other hand, the State also encourages organizations and individuals to establish environmental protection service enterprises in the fields of waste collection, recycling and treatment; environmental monitoring and analysis, environmental impact assessment; development and transfer of environmental friendly manufacturing technologies, environmental technologies; consultancy, training and provision of information on environment; environmental inspection of machines, equipment, technologies; evaluation of environmental damages and other services on environmental protection. In addition, the State creates favourable conditions for organizations, individuals and social communities to participate in management, protection and sustainable development of water resources in river basins and prevention of impacts caused by water (Clause 3, Article 7, Decree No. 120/2008/ND-CP).

In other words, policies on promoting and supporting environmental protection of river basin water have been gradually formulated and developed in accordance with the integrated river basin water resources management strategy that Việt Nam is implementing. Promoting and supporting policies have adequately covered areas including supporting and promoting policies on capitals, land, infrastructure... for manufacturing organizations and enterprises; promoting and supporting social organizations and communities to participate in environmental protection of the river basin water. Consequently, organizations, individuals and enterprises have motivations for responsible participation in environmental protection of the river basin water. Currently, some localities have implemented the model of community based environmental protection and achieved positive outcomes, specifically such as the model of environmental protection commitment, self-management of environmental pollution treatment, integration of poverty reduction with environmental protection, environmental sanitation... Of which, socio-political organizations (Women' Union, Farmers' Union, Youth Union...) play important roles in environmental protection.

However, during the implementation, there are some shortcomings and difficulties such as lack of specific guidance on special mechanism; it takes a long time for projects to get approval from the authorities; policies promoting local communities to participate in environmental protection of the river basin have not closely linked to practical benefits of communities and have not attracted adequate participation of local people in environmental protection of the river basin water.

To better enhance the implementation of policies on promoting and supporting participation in environmental protection of the river basin water, Ministries: Finance, Planning and Investment, Natural Resources and Environment need to have specific guidance on the nomination of projects in order to implement the National Target Program on pollution mitigation and environmental improvement, particularly priority mechanism for technical infrastructure investment projects; the Ministry of Natural Resources and Environment needs to collaborate with other relevant Ministries and sectors to provide guidance on the implementation of promoting and supporting policies to create conditions for enterprises to access to concession loans for river basin water pollution treatment. Furthermore, localities located in the river basin system needs to promote the participation of local communities in environmental protection of the river basin water, to renew communication contents and formats, to develop models on promoting and supporting communities to participate in environmental protection…■

Enhancing environmental protection in transport sector

TRẦN ÁNH DƯƠNG
Director General of Environment Department
Ministry of Transport

To implement Resolution No. 41/NQ-TW dated 15/11/2004 of Politburo of the Việt Nam's Communist Party on environmental protection in the period of boosting the country industrialization and modernization and Resolution No. 24/NQ-TW dated 3/6/2013 of 11th Party Central Committee on proactively responding to climate change and enhancing natural resource management and environmental protection, Ministry of Transport has enacted Directive No. 07/CT-BGTVT dated 3/8/2016 on enhancing environmental protection in transport sector towards developing a sustainable and environmentally friendly transport system.

▲ *Emission for road vehicles is one of the causes for air pollution*

In recent years, environmental protection in transport sector has made positive progress. Environmental protection organizations and individuals have been established. Staff's awareness on environmental protection has improved. Environmental regulations in public transport have been developed and enacted to meet practical needs. Strategic environmental assessment (SEA) and environmental impact assessment (EIA) have been seriously conducted for master plans and strategies and investment projects. Vehicles pollution control and prevention have been carried out. Some environmental protection programs and projects have been developed, approved and implemented with certain achievements.

However, environmental protection in transport sector remains some issues. Air pollution in urban areas, in particular Hà Nội and Hồ Chí Minh city tends to increase. Road vehicle emission has contributed significantly to this problem. Environmental protection requirements for vehicles are increasingly stringent, in particular for vehicles operating in international routes. Dust pollution is becoming common due to transport infrastructure development. Waste collection and treatment remain incomprehensive, responsive and ad hoc.

To address these issues, on 3rd August, 2016, Ministry of Transport issued Directive No. 07/CT-BGTVT on enhancing environmental protection in transport sector. This Directive requires the Ministry's departments and units to focus on the following tasks:

Reforming environmental protection propaganda and awareness raising for staff members of the Ministry: Integrating environmental regulation propaganda into human resource training, boosting environmental propaganda in transport infrastructure construction, trade and services, increasing the quantity and quality of news and information dissemination on environmental regulations and environmental protection in transport sector on internet and publications, proactively organizing and launching campaigns of the youth participation in environmental activities (World Environment Day, Biodiversity Day, World Ocean Day, and Việt Nam's Seas and Islands Week);

Improving organizational structure and human resource qualification of environmental protection staff in trans-

port sector: Reviewing and improving environmental technical qualification for agencies and units under Ministry of Transport, studying and integrating environmental protection indicators in evaluating performance of agencies and units under the Ministry, proactively searching for international and domestic funding sources for training and improving capacity of environmental protection staff, assigning managers with environmental tasks and strengthening staff capacity in environmental protection and energy saving and efficiency.

To improve effectiveness of environmental protection in transport sector in a period 2016 - 2020, the Transport sector will implement the following key tasks:

Implementing environmental protection in transport infrastructure development

The Environment Department, Planning and Investment Department and Transport Work Quality and Construction Management Department are responsible for guiding and supervising environmental compliance in development of strategies and master plans, investment and maintenance of transport infrastructure and increasing compliance checking. The departments will ensure sufficient funding for SEA, EIA, and environmental protection plans when developing strategies, master plans and transport infrastructure. They will provide advice so that investors shall take measures for monitoring minimizing negative impacts in design and implementation stages.

Environmental protection in managing vehicles and transport

Speeding up the development and submission to the Prime Minister of a roadmap for applying emission standards of vehicles and motorbikes in big cities; applying three tiers for motorbikes and four tiers for newly manufactured, assembled and imported automobiles following Decision No. 49/2011/QD-TTg dated 01/09/2011; proposing a roadmap for increasing emission standards for imported used vehicles and existing vehicles.

Reviewing and developing regulations, technical regulations and standards for implementing articles in Annexes III, IV, V and VI of the International Convention on the Prevention of Pollution from Ships and International Convention of the Control of Harmful Anti-Fouling Systems on Ship; promoting services of collecting and treating hazardous wastes from sea and inland cargo ships.

Studying and developing regulations on civil aviation in accordance with requirements of International Civil Aviation Organization (ICAO); directing the airlines to organize the collection and treatment of aircrafts in compliance with environmental protection.

Provincial Departments of Transport shall study and propose to Provincial People's Committees for promoting public transport (in particular mass rapid transport systems) and investing and operating energy saving buses and taxis (such as hybrid, clean fuel, electronic and natural gas vehicles).

Environmental protection in production, trade and services in transport sector

Department of Transport Health shall proactively search for funding for completely treating wastewater in medical centers in transport sectors, directing the medical centers to collect, segregate, store and sign contracts with competent waste treatment authorities; properly operate wastewater systems to meet environmental standards and prevent the addition of new serious polluters.

Transport production, trade and service establishments shall review their environmental records and those under their affiliations to ensure the compliance of requirement on environmental protection programs as stipulated at Point 2, Article 22, Government's Decree No. 18/2015/ND-CP dated 14/02/2015; establish and apply ISO 14001 Certification in Environment Management and develop and implement fuel consumption norms, regulations on energy saving and efficiency; invest in infrastructure and equipment for collecting, segregating, storing and treating waste to meet environmental requirements; develop plans (or roadmaps) to increase investment in technology changes to remove heavy energy consumption and pollution technologies; organize regular monitoring on emission, wastewater, noise and vibration for environmental compliance■

Việt Nam and EU share experiences on Green Growth Strategy

The Seminar focuses on the following key issues: to discuss the Việt Nam National Green Growth Strategy, in particular the cross-cutting issues with the fight against climate change and efforts in the post-Paris Agreement on climate change at COP 21; and to share the EU's expertise in decision-making and implementation of Green Growth Strategies in Europe, and to exchange views on strategies and their implementation in Việt Nam and how to increase international support in the field of green growth.

Besides, it addressed green growth at the strategic level, involving the Central authorities and comparing strategic planning at the level of the EU and the Government of Việt Nam covering areas such as green industry and renewable energies, green cities and green building, and green finance; and to outline the strategic planning in Europe and European support to strategic planning and implementation in Việt Nam, including outline of the private sector's role and European enterprises' contribution to green growth.

Mr. Nguyễn Thế Phương, Deputy Minister of the Việt Nam Ministry of Planning and Investment said the nation has joined the Paris climate agreement that has been approved at the COP 21 in November 2015 with commitments through the implementation of Intended Nationally Determined Contributions (INDCs), the Government agencies and development partners have then carried out different activities to promote the implementation of these commitments.

To date, five Ministries, almost 30 provinces, cities in Việt Nam have developed and implemented their Green Growth Action Plan, many provinces/cities and businesses have identified this as an important task which is being implemented in different aspects: Resource mobilization, institutional and policy improvement, capacity strengthening, technology. With the activeness of Ministries and sectors, the draft INDCs implementation plan of Việt Nam is being finalized for submission to the Government for consideration and approval. These efforts contribute to concretizing Việt Nam's actions towards the sustainable development goals by 2030.

According to Mr. Bruno Angelet, Ambassador - Head of Delegation of the European Union to Việt Nam, the European Parliament ratified the Paris Agreement on climate change on October 4th, 2016. As being world leader in fighting climate change and in promoting green growth, the EU demonstrates that economic growth can go together with reduction of greenhouse gas emissions and our partnership with Việt Nam pursues the same objectives. **ĐỨC ANH**

● Steering Board to address issues related to environmental incidents

The Prime Minister signed a Decision on the establishment of the Steering Board on measures to stabilize lives, production and business for local people in four localities seriously affected by the Formosa-caused environmental incident.

Deputy Prime Minister Trương Hòa Bình is appointed as head of the Steering Board and other 18 members from the Ministries: Natural Resources and Environment, Labor, Invalids and Social Affairs, Finance, Science and Technology, Health, Industry and Trade, Culture, Sports and Tourism, Justice, Planning and Investment, Information and Communications and Public Security, the Government Office, the Việt Nam Academy of Science and Technology and the Chairman of four central provinces of Hà Tĩnh, Quảng Bình, Quảng Trị and Thừa Thiên - Huế

VŨ NHUNG

● A boost for environmental protection

The Prime Minister ratified the Project on developing an environmental service business network to 2020, with vision to 2030. The Project targets to improve waste treatment, control pollution, and better environmental quality. By 2020, 70% of sewage in urban areas will be treated; 95% of solid waste will be collected for treatment; 75% of solid waste in rural areas will be collected for recycling; 85% of solid waste will be collected for fertilizer production; 85% of harmful waste will be demolished and buried; and 50% of contaminated areas will be handled.

By 2030, the environmental business network would be able to meet 100% of domestic demands on environmental services; and provide environmental services to other regional countries. To fulfill the aforesaid goals, the Project targets to perfect the mechanisms and policies which support environmental service enterprises; build plans to develop the environmental service network by 2020 with a vision towards 2030; re-arrange and encourage investment in the sector; and help improve competitiveness for environmental service enterprises.

The project supports technological transfer for recycling enterprises; capital attraction for environmental business; and environmental auditing. **PHƯƠNG LINH**

Environmental ethics - From thought to action

Prof. Dr. LÊ VĂN KHOA
The Consultant and Development Institute (CODE)

The rapid industrialization and modernization that Việt Nam has been undergoing have not only generated "hot" economic development for the country, but also affected its natural resources. In addition, an increasing population with growing demand and consumption has consumed and destroyed natural resources more quickly than they are being restored. Human beings with limited knowledge of nature will destabilize the ecosystem and lead the world towards destruction. Therefore, people have started implementing a code of conduct with regard to the environment based on legal and economic rules to exploit natural resources within limits. However, this tool has not proven effective enough. Thus, the issue of environmental and ecological ethics was raised to build a relationship between humans and nature and the environment to create ecological balance and sustainable development.

CHANGES IN NOTION OF ENVIRONMENT ETHICS

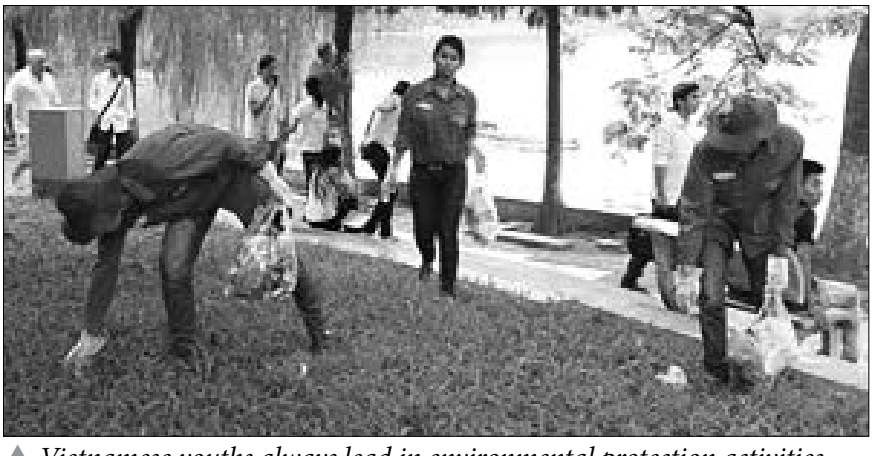
In the past, academic textbooks and folktales taught Vietnamese students their country was rich and filled with natural resources. This education instilled in students a sense of pride and love for their country, but it also led to an illusion and dependence on nature and resources. Meanwhile, the Japanese taught the younger generation to be hard-working and creative, use natural resources in an efficient way and protect the environment, because Japan is poor in terms of natural resources and is often affected by natural disasters. From Japan's lessons, Vietnamese youth are changing their attitude and realizing environment protection is a vital issue for the country. Activities in environment protection have gained the attention of the Government and the Communist Party of Việt Nam. The country's leaders have issued several documents to educate and disseminate policies to raise awareness among the people and enterprises about using natural resources efficiently and protecting the environment. A lot of environment protection activities have been organized urging the people to participate in creating healthier living conditions.

DEVELOP ENVIRONMENTAL ETHICS IN DIFFERENT FIELDS

In agriculture, the inappropriate use of toxic chemicals and fertilizers to grow plants and the use of illegal chemicals in animal feed are issues that environmental ethics must address. Producers must follow the "four-rights principle" - right chemical, right dosage, right method and right time - when using pesticides and animal growth stimulants. Producers must mix chemical fertilizers and organic fertilizers in a balanced ratio to avoid polluting the land and water and help symbiotic creatures develop. This way, environmental ethics of farmers will be witnessed through the quality of their products. A product reaches its ecological and environmental value if it is able to protect the health of customers and preserve nature.

In industrial production and trade villages, many producers do not have sustainable production lines. Their production lines discharge toxic waste, such as chemicals, heavy metal and difficult to dispose organic substances, which lead to diseases such as cancer and breathlessness. Some typical reasons for these issues are lead pollution at the lead-recycling trade village in Chỉ Đạo commune, Hưng Yên province's; pollution of the Thị Vải river caused by Vedan Enterprise Corporation and the fish killed by the waste discharged by Formosa Hatinh Steel Company in the Central region of Việt Nam. These cases prove that there are limits in the implementation of environmental policies and in corporate social responsibility as companies are unaware of the relation between their production and environmental ethics. Therefore, it is necessary to improve corporate social responsibility so that local businesses are made aware of their legal and ethical responsibility to the whole community.

Wastage of electricity, clean water and food also violates environ-



▲ *Vietnamese youths always lead in environmental protection activities*

Some differences between former and current understanding of environment

Former understanding (the theory of environmental control)	Current understanding (the Gaia theory)
Unlimited natural resources on Earth	Limited natural resources on Earth
Search for new resources when the current area runs out of resources	Prefer recyclable products and natural resources
Living conditions improve mainly on physical conditions	Physical conditions play a part in people's living conditions
People must take control of nature	People must cooperate with nature
Advanced technologies help resolve environmental issues	Ethics help environmental issues
Wherever people are, there is waste	Waste is only temporary in the ecosystem, does not exist in the long run

mental ethics. Firstly, consumers must collect and classify the waste at source and implement the 3R (reduce, recycle and reuse) process to minimize environmental pollution. Moreover, consumers and the public can protest against products that are unfriendly to the environment, such as forbidden substances that cannot be used in producing food, growing plants and feeding animals. This will change producers' environmental ethics resulting in safe, high-quality and valuable products for the community.

RECOMMENDATIONS TO ENHANCE EDUCATION OF ENVIRONMENTAL ETHICS ON USING AND PROTECTING NATURAL RESOURCES IN A MORE EFFECTIVE WAY

Teaching everyone to save natural resources: At school, students should be taught to save electricity and water, protect school property and recycle waste so that they can come up with their own ways of using and spending efficiently.

Besides this, environmental ethics should be popularized among Government officials at all levels. Local authorities play an important role in educating the local community to protect and preserve natural resources and environment, since they manage the ecosystem of the sea, forest and land in the area.

Developing a new consumption style: The three main factors that can affect sustainability are population, technology and lifestyle. Lifestyle is an element that directly influences the development of society. Lifestyle displays not only the relationship among people, but also between people and nature. In the person-nature relationship, lifestyle exists in the way of consumption. According to statistics, the figure of beer, alcohol and cigarettes produced, imported and consumed is increasing fast compared with the average income of the population. On average, Vietnamese people each year spend 18 trillion VND on cigarettes, twice the country's total agricultural exports. Therefore, each and every individual in society must reduce consumption to develop a prudent lifestyle, produce no waste and protect nature.

In addition, people need to implement "green shopping" or "ecological shopping," meaning that they should buy and consume environmentally-friendly products. Customers need to consider criteria on environment protection and prices to minimize the effects on their health and environment.

Environmental ethics need to be adjusted by laws and society: Environmental protection must be popularized via public media, such as books, newspapers, radio and television, and promoting people and organizations that either have good or bad effects on environmental protection to develop common environmental ethics. To initiate positive actions on environmental protection, we need to provide people with news and information about the environment and negative activities that damage and destroy environment and human life. Criticism of the public, in many cases, is more powerful than ethical principles and legal regulations. Thus, attracting public attention is a necessary and effective tool to improve people's awareness about environment protection.

Use of cultural, artistic activities, field trips and local customs and traditions to change people's behaviors towards natural resources: One of the solutions to enhance environmental protection is to use cultural and artistic activities, field trips, local customs and traditions. Through those activities, people will pay attention to preserving and protecting famous places with valuable ecosystems, including Hạ Long Bay, Cát Bà National Park and Phong Nha - Kẻ Bàng Cave.

Additionally, we need to preserve cultural traditions that could help protect the environment, such as worship of the God of mountain, the God of river and Spring planting■

▲ *Model of organic vegetable planting contributes to environmental protection and sustainable agriculture development*

Integrated waste management - New direction with efficiency

▲ *Mr. Tetsuo Minami - Director of International Cooperation Department - Global Environment Centre (GEC)*

Recently, the integrated waste management (IWM) is considered a new direction for waste management in many countries. In particular, Japan is the leader country in the treatment of waste and environmental protection. Things that Japan has been doing in waste treatment would be lessons for Việt Nam. To acknowledge this issue better, Environment Magazine had an interview with the Director of the International Cooperation Department - Global Environment Centre (GEC) Tetsuo Minami.

✶It is said that for the purpose of IWM to process effectively, we must treat waste as a resource whichhas an important role in the economic development. What are your comments about this problem?

Mr. Tetsuo Minami: I totally agree with the comments above. When natural resources are being depleted, the waste is considered a precious resource that people can recycle and reuse. In the world, some countries have succeeded in utilizing waste as renewable resources, with modern closed process for usage orientation, collection, sorting, recycling and production of environmentally-friendly products, in particular, can be exported to other countries.

In fact, waste is a rich resource, which if being properly exploited will contribute to environmental protection and greater economic benefits than new production. For example, the production of 1 ton of pulp requires 100 m^3 of water; however, recycling 1 ton of recycled paper can save 32 m^3 of water, 4200 kWh of electrical energy (which can be used by a family of 4 people in a year). Moreover, paper recycling not only takes advantage of available resources and minimizes environmental pollution but also saves energy. In addition, for green materials such as glass, it can be recycled many times without lowering quality. Glass recycling helps to reduce air pollution by 20% and 50% of water pollution.

✶What do you think about IWM? What helped Japan to successfully apply this method?

Mr. Tetsuo Minami: IWM allows aggregated consideration of aspects related to waste management such as natural environment, society, economy and institutions, with the participation of the stakeholders on the components of the quality management system waste (minimization, collection, reuse, recycling, landfilling). This approach is an integrated solution, ensuring sustainability in choosing planning and environmental management in specific conditions.

In IWM, prevention is the leading principle, which helps to prevent emissions or avoids creating waste. When emissions are reduced to the level equal to 0, it is the absolute prevention, which is an effective way to reduce emissions directly from the source. In the process of production and consumption, reducing emissions will reduce the costs for the next stages of waste treatment (reuse, recycling, recovery and landfilling...).

Japanese people use many kinds of goods and all of those will become waste after usage. Without recycling goods promptly, we will be run out of resources and energy, and habitat will be severely affected. Being aware of this, the Japanese people always attach importance to environmental protection, especially waste disposal problems. The Japanese Government has issued the Law on Promotion of using recycled resources in 1992 and the Law on Promotion of the collection, sorting and recycling of packaging in 1997. Thereby, the efficiency of use of the recycled products was improved by clearly defining the responsibilities of the stakeholders.

The success of the IWM in Japan originates from the result of 3 organic sticking factors. First is the involvement of the community, expressed by identifying problems, measurement and solutions for specific environmental problems caused by waste. Therefore, the ownership and responsibility of the community in environmental protection were increased to ensure their people's right to live in a Green - Clean - Beautiful environment, while enjoying the benefits brought by the environment. In order to achieve this, the Japanese Government has been lobbying, advocating and enforcing people for waste separation at the source.

Also, we can not fail to mention the investment of the government and society into

▲ *Waste sorting has become a habit of Japanese people*

recycling facilities. Thus, the economic and social development with the awareness of the community, the investment in infrastructure for processing and recycling has an important role.

✶***According to you, are those solutions feasible to be applied in Việt Nam?***

Mr.Tetsuo Minami: Việt Nam is developing towards industrializing and modernizing. This is also the main cause of the growing in waste generation. However, Việt Nam can learn from Japan and other advanced countries in IWM, especially about the issues related to legislation, institutions, resources, actual state of solid waste, solid waste treatment technologies of local areas, as well as methods of data collection for orientating the appropriate solid waste treatment method in the future.

Japan has always been interested in electronic wastes and considered it as an income for the country. For many people it's just garbage but Japanese people consider it to be a gold mine. This kind of waste could be the mobile phone, television, computers, digital music players..., generally old electronic devices which were discarded. We can "dig" for gold, silver, copper and other metals inside the device. This type of recycling is called "urban mining", disassembling old electronic devices in order to recover valuable metals such as iridium and gold... This industry is currently "cash in" in Japan, especially in the context of the prices of various types of metal continually break records.

Việt Nam is on the path of sustainable development, Vietnamese are hardworking in research, learning; thus, if considering the feasibility, market demand, the interests of stakeholders and the actual conditions of each locality, I believe that Việt Nam can apply IWM with efficiency.

✶***Thank you!***

MAI HƯƠNG *(Implemented)*

1. SUSTAINABLE DEVELOPMENT CITIES

In the era of globalisation and urbanisation, the character and position of cities, particularly mega cities, have increasing determining roles in regional and national sustainable development. According to the data of the United Nations Population Reference Bureau (PRB) published in 2004, the world population was 6,396 million, of which the proportion of urban residents was more than 50%, on average, of developed countries 76%, of remaining countries 41%. Also according to the data of PRB in July, 2014, the proportion of global urban residents was 54%, it is estimated that by 2050, more than 2.5 billion people will live in cities; the proportion of urban residents will be 66% globally.

In Việt Nam, the "renewal" (in 1986) has opened a rapid urbanization period. In 1990, there were 500 small and large urban areas; it was 649 in 2000 and in June, 2015, it was 778, of which there were two special urban areas, 17 type I, 25 type II, 43 type III, 90 type IV (town) and 601 type IV. Currently, the proportion of urban residents in Việt Nam is about 38%. According to Decision No. 445/QD-TTg, dated 7/4/2009 on orientating the planning of Việt Nam urban development in Việt Nam to 2025, vision to 2050, about 50% of the population will live in urban areas by 2025.

According to ADB, the socio-economic development in different countries will take place in big cities. In ASEAN member states, nearly ¾ of GDP and about 2/3 of the national export product volume are contributed by urban areas such as Metro Bangkok (in 2005) which contributes up to 44% of Thailand's GDP, Metro Manila (in 2006) making up 37% of the Philippines's GDP, Hồ Chí Minh city (in 2006) accounting for 23.5% of the Việt Nam's GDP.

At the World Summit in 1992 in Rio de Janerio, Brazil, 179 countries, including Việt Nam, agreed viewpoints on environmental protection and sustainable development, and considered it as the common responsibility of the whole humanity and agreed to endorse the Rio declaration on sustainable development (Agenda 21). On 17th August, 2004, Việt Nam promulgated the strategic orientation on sustainable development sustainable development (Việt Nam's Agenda 21) to promote sustainable development of the country based on the close and harmonized combination between economic development, social development and environmental protection.

Establishing sustainable criteria for cities to drive the national sustainable development

Prof. Dr. PHẠM NGỌC ĐĂNG
Vietnam Association for Conservation of Nature and Environment

The Ministry of Planning and Investment has proposed the sustainable development indicators with 24 criteria. The sustainable development office, the Ministry of Natural Resources and Environment (MONRE) has proposed the index and criteria to assess the sustainability on natural resources and environment. This index consists of 10 themes; each theme has some indicators, totalled up to 27 indicators.

However, by now, in Việt Nam, no provinces or cities develop plans for sustainable development, only Đà Nẵng city endorsed a plan and an orientation to become an environmental city by 2030. Therefore, the development and promulgation of the index on sustainable city in Việt Nam is necessary. Sustainable development of cities drives the national sustainable development.

Currently, there are different concepts on cities relating sustainable development such as ecological city, green city, environmental city, environmental sustainable city, sustainable city, and liveable city. Therefore, it is necessary to unify definition of a sustainable city. It could be understood as "sustainable city development is the harmony and balance between economic development, social development and environmental protection, aiming to create living conditions of urban residents to be wealthier, happier and more comfortable for the current generation without causing burdens to the future generation".

2. INTERNATIONAL EXPERIENCE IN DEVELOPMENT OF INDEX ON SUSTAINABLE DEVELOPMENT

In the world, many international organizations, the US, and European countries have proposed sustainable development index. Here are some typical criteria on sustainable cities:

• Criteria on environmentally sustainable cities

On the occasion of the World Environment Day (in 2005) in San Francisco (America), UNDP and UNEP organized an international conference on development of environmentally sustainable cities, with representatives of cities of more than 100 countries and many international organizations. The Conference has adopted the "United Nations Urban Environmental Accords in 2005". Accordingly, the accords identify systems of criteria for environmentally sustainable cities, covering seven areas: energy; waste reduction; urban design; urban nature; transportation; environmental health and water. Each area has three criteria, totalled up to 21 criteria.

In 2005, the Secretariat of ASEAN launched the campaign to develop environmental cities and assess, select and award environmental cities in ASEAN countries every two years. The assessment of environmental cities of ASEAN is based on four criteria: clean air, clean water, clean soil and biodiversity. Hạ Long, Đà Nẵng and Bắc Ninh cities are recognized as ASEAN environmental cities.

• Sustainable urban project in Europe coordinated by the International Institute for the Urban Environment with the participation of 12 cities of Denmark, Germany, Belgium, England, Spain, and Italy. The results of five years implementation (1985 -1990) showed that the project has developed 10 European sustainable city criteria: clean environment; green space; effective natural resources use; environmental quality; transportation comfort and safety; green economy; landscape conservation, cultural and historical relics conservation, biodiversity conservation; community participation; social equality, gender balance; social welfare, and good living conditions.

• Sustainable city assessment criteria in England

Since 2007, the "Forum for the Future" in England has conducted the assessment of sustainable development for cities based on 13 criteria covering three thematic areas: environmental impacts consisting four criteria (air quality, environmental impacts on ecosystems, solid wastes, and biodiversity conservation); living standards with five criteria (infants health, life expectancy of residential community, transportation, job, education, and green space); response to the future consisting of four criteria (response to climate change, competitive capacity, waste recycling and reuse, security and food safety).

• Plan for sustainable city development in Minnesota (America)

Since 2007, the Government of Minneapolis city in Minnesota (America) has proposed the plan for city's sustainable development with 26 criteria, divided into three themes:

- Health and life, consisting of six criteria: Health of infants; pregnancy rate of the youth; rate of HIV infection in community; resident weight index; resident respiration in-

▲ *Sustainable city is the harmonized and balanced development among economic development, social development and environmental protection*

dex; lead poisoning in community.

- Environmental impacts, consisting of 12 criteria: Response to climate change; proportion of renewable energy; air quality; area of green trees; proportion of residents using non-mechanic transportation vehicles; public transport; noise pollution; pollutants in rain water; river water quality; labour - job; food safety, and waste reduction and recycling.

- Social issues and livings of communities, consisting of eight criteria: Proportion of deaths due to environmental pollution; violations and violence rate; community consultation by authorities and participation of the communities; rate of homeless people; housings for low income people; jobs and poverty; average rate of high school graduation; and arts and economic development level.

• Criteria of sustainable cities

The Design and Consultancy for Natural and Built Assets (ARCADIS, 2015) has introduced the sustainable city index with 20 criteria. This criteria index is the synthesis of practical assessment on sustainable cities in 50 top cities in the world such as London, New York, San Francisco, Frankfurt, Paris, Amsterdam, Brussels, Moscow, Rom, Toronto, Melbourne, Sydney, Mexico city, Johannesburg…; cities in Asia such as Tokyo, Beijing, Shanghai, Hong Kong, Wuhan, Singapore, Kuala Lumpur, Jakarta, Manila, Mumbai, New Delhi; and consultations with other international organizations in the world following the principle of "sustainable city is the balance and harmony between demands on economic and social development and environmental protection".

The ARCADIS sustainable city index consists of 20 criteria, divided into three themes: People with eight criteria (literacies, education; green space; health; jobless rate, income inequality, labour and job, and housing price); Planet with six criteria (energy consumption share; natural disasters; air pollution; greenhouse gas emission; water supply and environmental sanitation; and solid waste management) and Profits with six indicators (transportation; energy efficiency, connectivity with the world urban network; GDP per capita; favourable investment; and goods price and commercial costs).

In general, these above indexes are concise, short, transparent, and balanced among economic, social and environmental aspects; the number of criteria is 10 at the lowest, 26 at the highest and 18 - 20 at the medium range. Criteria of sustainable city come from developed countries; therefore they pay more attention on living standards and environmental protection than on urban economic development. However, it is impossible to have a common sustainable city index for the whole world, particularly for poor and developing countries, which are learning experience from developed countries.

3. PROPOSAL OF THE FRAMEWORK FOR SUSTAINABLE CITY INDEX IN VIỆT NAM

Firstly, the sustainable city index must ensure following principles: short, concise, and transparent, and covering basic contents and balanced and harmonised among three economic, social and environmental factors with about 20 criteria; feasible and quantitative assessment based on available information and data, such as data in the statistics books and annual reports of cities; no repeating such as the transportation system is an economic activity but it is also an activity to enhance the commute of local people, so it can belong to social theme at the same time it also relates to environmental pollution. However, transportation is just one criterion in one theme.

Based on above principles and reference to international and domestic materials, the proposed framework on sustainable city index is illustrated in Table 1.

Table 1. Proposal of sustainable city index framework in Việt Nam

Theme	No.	Sustainable city criteria	Scale	Explanations
I. Economic	1	GDP per capita	20	• GDP per capita • Annual growth rate
	2	Commercial conditions	7	Low investment expense, fast payment procedures, Financial transparency, corruption prevention
	3	Transportation	8	- Road system km/km^2, public transport, traffic safety
	4	Price of real estate and consumption products	7	Price of housing, price of consumption goods, Service price
	5	Energy use efficiency	8	Consumption of kg of oil or equivalent per 1000 USD GDP
		Total	50	
II. Socio	6	Education	6	- Rate of pupils, rate of students /1000 people; rate of illiterate people of more than 15 years old
	7	Community health	6	- Rate of infant mortality; average life expectancy; number of patient beds per 1000 people
	8	Housing	7	- Floor area/capita; housings for low income people; removal of "slumps"
	9	Income inequality	6	- Gain index
	10	Jobless rate	6	% total number of people in labour age
	11	Rate of poor households	6	- % of poor households according to regulation
	12	Social crimes	6	- Rate of drug addiction, rate of HIV infection, number of social criminal cases
	13	Area of green trees	7	- Rate of green tree area/total city area (m^2 green tree area per capita)
		Total	50	
III. Environmental	14	Energy consumption per capita	6	Energy consumption of kg of oil or equivalent/capita; rate of renewable energy
	15	Air pollution and noise pollution	6	- Concentration of participate particulars (µg/m^3), concentration of SO_2 (µg/m^3), noise level (dB)
	16	CO_2 emission	6	- tonnes of CO_2 per capita per year
	17	Water supply and environmental sanitation	7	- Rate of people to be supplied with standardised water (l/capita per day), street sanitation
	18	Solid waste management	7	- Rate of solid waste collection, rate of landfills, rate of converted to compost, rate of energy production
	1 19	River, lake pollution	6	- Concentration of BOD (mg/l), COD (mg/l) and suspended solid waste (mg/l)
	20	Flooding	6	- number of areas flooded by rain more than 50mm/time, Number of floods/year, average flooding time
	21	Response to disasters and climate change	6	- response to natural disaster - response to climate change
		Total	50	
		Total	150	

Based on the assessment, the sustainable city can be categorised into three levels:

The first level sustainable city: total scale between 136 and 150;
The second level sustainable city: total scale between 121 and 135;
The third level sustainable city: total scale between 105 and 120.
Below 105 city is not considered as a sustainable city.

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Promoting low carbon production and consumption in Việt Nam

NGUYỄN THỊ THU HOÀI
Vietnam Environment Administration

Currently, in the context of natural resources scarcity, many countries in the world are promoting low carbon product production and consumption. In Việt Nam, the production and consumption of low carbon products contribute to implement priority areas in the National Green Growth Strategy in the period 2011- 2020, vision to 2050.

▲ *Environmentally-friendly TK90 advanced cooker used by households in Phú Thọ province*

SOME PROJECTS ON PRODUCTION AND CONSUMPTION OF LOW CARBON PRODUCTS IN VIỆT NAM

In Việt Nam, the production and consumption of low carbon products have been implemented in some economic sectors such as industry, agriculture, forestry, construction... and through some programs and projects invested from the state budget and international cooperation between Việt Nam and other countries and organizations such as Denmark, Japan, and the Asian Development Bank (ADB).

Currently, the annual emission from agricultural activities is equivalent to 65 million tonnes of CO_2, accounting for more than 43% of the total national greenhouse gases. The main emission sources are from rice cultivation, burning of agriculture sub-products and animal husbandry waste. The development of models piloting low carbon agriculture production technologies are being paid greater attention.

For environmental improvement and greenhouse gas emission, towards the low carbon agriculture economy, the Government has collaborated with ADB to implement the Low Carbon Agricultural Support Project (LCASP) with three contents: Promoting biogas in medium- and large-scale livestock farming systems; biogas associated with comprehensive livestock waste management system; capacity building at all levels to create sustainability for the expansion of the model. The Project implements in 6 years (2013 - 2018) in 10 provinces: Hà Tĩnh, Lào Cai, Sơn La, Phú Thọ, Bắc Giang, Nam Định, Bình Định, Tiền Giang, Bến Tre and Sóc Trăng.

In addition, during 2013 - 2017, Việt Nam collaborates with Denmark in implementing the Project on Low Carbon Transition in Energy Efficiency (LCEE), with the objective to convert the low carbon economy through energy efficiency in small and medium enterprises and construction works. By now, the Project has produced six low carbon products: Ecological cooker using sawdust and straw (advanced husk cooker); biomass boiler (converted from coal boiler); continuous husk brick kiln (manual brick kiln); LGP kiln (converted from coal kiln); continuous husk ceramic kiln (converted from traditional craft ceramic kiln); technology improvement, energy efficiency in fisheries. Low carbon products have been researched for improvement to be appropriate with usage demand and economic development of Việt Nam. The LCEE Project is expanding the production and consumption of products in Bắc Ninh, Bình Dương, Cần Thơ, Đà Nẵng, Đồng Tháp, Hà Nội, Hải Phòng, Hồ Chí Minh city, and Quảng Nam.

Development of low carbon in some other sectors such as fishery and construction (low carbon city model, green criteria for design construction works), low carbon industrial zone… are being implemented in some cities/provinces such as Đà Nẵng, Quảng Nam.

In general, the promotion of production and consumption of low carbon products will contribute to green the production and to promote sustainable consumption. However, this has not been expanded as projects are mostly implemented with international support; only some projects are supported by the state budget.

SOLUTIONS TO PROMOTE THE PRODUCTION AND CONSUMPTION OF LOW CARBON PRODUCTS IN VIỆT NAM

Although the policy system on sustainable production and consumption is rela-

tively complete, solutions are still relatively general and difficult to implement. To promote the production and consumption of low carbon products, it is necessary to have collaboration among sectors and authorities to implement some specific solutions:

Finalising the legal framework: Reviewing, improving and implementing policies on green consumption and sustainable consumption, focusing on low carbon products; promoting programs to promote sustainable consumption in sectors and fields in the economy; implementing behaviour and habits change activities of consumers on low carbon products; studying criteria and developing procedures for low carbon products labelling to be appropriate with international criteria on low carbon products; effectively implementing policies on green procurement in order to enhance the consumption of environmentally-friendly products and to promote enterprises to participate in environmentally-friendly production.

Particularly, it is necessary to develop supporting policies and special incentive mechanisms for enterprises, organizations, and individuals to invest in greenhouse gas mitigation activities; formulate and improve trade policies, export tax, and import tax on low carbon products to be appropriate with international and regional integration, as well as environmental agreements, bilateral and multilateral free trade agreements.

Science - technology development: Promoting 3R development (waste reduction, recycle, reuse); enhancing scientific research and technology development on clean energy, reducing investments on substantial emission projects; encouraging initiatives on low carbon technologies; implementing scientific and technology activities on agriculture, forestry, land use and energy.

Economics: Promulgating mechanisms and policies supporting and motivating enterprises to participate in low carbon products manufacturing industry; organizing exhibitions and conventions and supporting enterprises to introduce products in supermarkets that have shelves allocated for low carbon products; creating investment capitals on innovations, technologies responding to climate change, green projects, green jobs; incentives on tax, fees for low carbon products.

Awareness raising, education, communication: Providing training and disseminating knowledge, policies and legislations on production and consumption of low carbon products for staff, enterprises and labourers; integrating contents on general sustainable production and consumption and particular low carbon products in education programs at all levels. On the other hand, designing environmentally - friendly advertisement and propaganda programs; developing and implementing communication and propaganda programs on eco-labelling for consumers; implementing labelling, awarding in commercial areas; promoting the role of the mass media in propaganda, disseminating the benefits of low carbon products…

At the same time, the enterprise community needs to actively involve and promote strategies, policies, national action plans on sustainable production and consumption, and green product consumption. Consequently, creating motivations to change the manufacturing technologies towards cleaner production; energy efficiency, fuel savings, and renewable energy usage■

● Two National Target Programs on the environment and climate change were deployed

The Việt Nam's Government has issued a resolution approving the investment policy for 21 Target Programmes in the period 2016 - 2020, including 2 program chaired by the Ministry of Natural Resources and Environment (MONRE): National Target Program on thorough handling of public-interest establishments causing serious environmental pollution; National Target Program on Climate Change Response and Green Growth. Total capital for implementing the Program is 20,514 billion VND.

The thorough handling of establishments causing serious environmental pollution have been implemented since 2003. Till date, many facilities have been relocated. However, the handling of public-interest establishments causing serious environmental pollution is facing some difficulties. In particularly, it is difficult to suspend the operation of public-interest facilities such as hospitals and landfill. The investment of Government into National Target Program to thoroughly handle the public-interest establishments causing serious environmental pollution is expected to improve the efficiency of environmental pollution treatment towards sustainable green environment.

The National Target Program on climate change response and green growth is following the National Target Program on climate change response implemented from 2008. The success of the Program is the clear improvement in the awareness of the authorities at all levels and people. Particularly, along with the Support Program to respond to climate change, Việt Nam has attracted more than 1 billion USD from foreign investors for these activities to respond to climate change. The National Target Program in the period 2016 - 2020 will further enhance green growth activities towards the implementation of the Paris Agreement on climate changes, global emission reduction, Việt Nam towards low carbon economy.

NAM HƯNG

Treatment technology of domestic solid wastes for rural areas in Việt Nam

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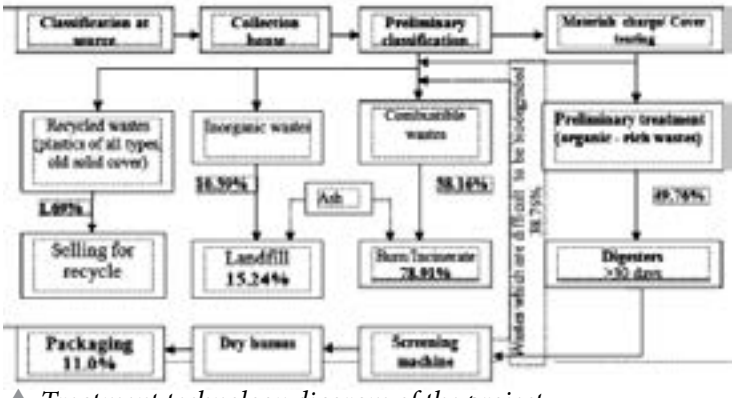
During the socio-economic development, under the impacts of natural factors and human activities, a variety of environmental problems are occurring. One of the most emergent issues need to be handled is the pollution from domestic solid wastes. The Vietnam Environment Administration has assigned the Center for Environment Consultancy and Technology to implement a pilot project on treatment technology for domestic solid wastes in rural areas in Việt Nam in accordance with New Rural Program in Việt Nam. The project has been implemented and achieved three important indicators: (1) To totally treat domestic solid wastes in order to meet the current standards and regulations; (2) To ensure the sustainability of the project with low treatment cost; (3) The machines and equipment for the project shall be manufactured domestically, and easy for operation and appropriate with the workers' capacity in the rural areas.

The project was implemented in Hồi Ninh commune, Kim Sơn district, Ninh Binh province which is one of the prominent areas for Viet Nam's rural areas in Nhuệ - Đáy river basin. The project constructed and completed for operation and handled to the local authority with the capacity of four tons/day.

I. TREATMENT TECHNOLOGY

The treatment technology process of the project consists of the following main steps: classifying wastes at sources; transporting and collecting wastes; preliminarily classifying wastes; tearing covers and stirring wastes; collecting recycled wastes; burning wastes; landfill inginorganic wastes and composting, producing organic humus. The detailed process of treatment is presented below:

(1) Classifying at source: Wastes are sorted at source at households in the commune into two categories as required by the project, including: inorganic wastes (chinaware pieces, porcelain, bottles, broken bricks, ...)



Treatment technology diagram of the project

and the remaining synthetic wastes (mostly organic and combustible wastes). The inorganic wastes are contained in separated bag before moving to the communal collection vehicles to transport to the treatment area.

(2) Collecting wastes: Wastes are transported from the residential areas to the treatment areas twice a week (on Thursdays and Sundays); at the sorting and composting house,wastes are stored prior to treatment according to the process. Right after collection, wastes are sprayed with probiotics for deodorant and anti-flies. Periodically, in two weeks, wastes are processed every Mondays.

(3) Preliminarily classifying: Wastes will be classified preliminarily to separate inorganic wastes that were sorted at source (bricks, stones, pieces of crockery, pieces of glass …)

(4)Tearing cover and stirring waste: After preliminary classification, the remaining wastes are contained in bags and torn and stirred by machines, in which wastes are mixed to enhance the effectiveness of exposure and compost process. The remaining rich organic wastes will be composted.

(5) Preliminary treatment: At the floor of the composting house, the organic-rich wastes are mixed with probiotics in accordance with the guidance of the project prior to the composting process in the digesters.

(6) Composting at digesters: The anaerobic decomposition process is very complex which relates to hundreds of reactions and types of intermediate products. However, in the organic-rich waste treatment, the composting process can be considered as a stable biochemical process of organic matters to turn into humus, with scientifically controlled steps of manufacturing, creating the optimal environment (temperature: 40-55^{o}C, humidity: 50-52%), composting process also generates heat due to the oxidation of rotting substances. This process is complicated

▲ *Guiding people in Hồi Ninh commune to classify the wastes at source*

resolution of carbohydrates, lipids and proteins, with the participation of anaerobic microorganisms. The composting principle is using the added microorganisms selectively (to shorten the incubation time). Used microorganisms are bacteria lactobacillus and saccaromyces, which aim to resolve organic compounds, thereby shorten the composting time to about 30 days.

To optimize this incubation stage, the project has launched an effective, simple and manually operated process of incubation to reduce costs as well as to meet the requirements for the qualification of operators. In the composting process, periodically 1-2 days (depending on the season) to conduct additional spraying to control the factors of humidity, temperature and to supplement microbiological substances for the completely decomposed wastes. In addition, the anaerobic composting process will also eliminate some pathogens from the original wastes, reduce the moisture in the persistent organic parts that facilitates the combustion.

(7) Screening to collect the organic humus: After incubation according to the regulated time, the digesters are uncovered and open ≥ 24 hours. Wastes are moved to screen machine, then separated into organic humus and the remaining non-organic humus. The organic humus is put under the sun (or to dry naturally) to ensure moisture as required before packaging and storing in the warehouses. The non-organic ingredients are brought to the incineration unit. The quality of organic humus must meet some of the technical indicators for organic fertilizers according to National Standard TCVN 7185: 2002 applied to the organic fertilizers for soil.

(8) Incinerating: Combustible wastes are collected from the stage of preliminary classification (38.16%) and partly non-organic wastes (organic wastes are difficult to be biodegraded ~ 38.76%) from the stage of classification to collect organic humus. The total amount of wastes burned is 76.91%. The relatively dry wastes (humidity ≤25%) will be burned earlier. The higher humidity wastes will be dried on the concrete deck or burnt on the floor. The incineration will be conducted when collecting wastes are enough to burn continuously for at least one working day (one shift) or burn for several continual days.

The incineration technology does not absolutely use fuel, incinerators designed to ensure compliance with regulations, hazardous constituents in ash after combustion guaranteed under QCVN 07: 2009/BTNMT - The threshold for hazardous wastes, waste gas from the incinerators are handled at two levels in compliance with QCVN 30: 2012/BTNMT - National technical regulations on industrial waste incinerators before getting into the chimney and discharged into the environment.

(9) Landfilling inorganic wastes: The wastes that shall be landfilled including inorganic waste from the stage of preliminary classification (~ 10.39%) and the incinerator ash (~ 12.7% compared to the burning wastes). The total amount of waste sent to landfill is 15.24% (percentage burial). In addition, the project will use a part of ash to mix with the organic humus and soil to plant cassava and pumpkin... that brings economic efficiency and reduces landfill rate to about ~ 10%.

(10) Recycled wastes: The recycled wastes are classified, stored and sold periodically to the organizations which have capacity and operation licenses and use the recycled wastes for recycled materials.

▲ *Waste treatment incinerator*

These wastes consist mostly of solid old sacks (1.36%) and plastics of all kinds (0.33%).

II. ECONOMIC EFFICIENCY AND MODEL REPLICATION POSSIBILITY OF THE PROJECT

Economic efficiency is one of the most important criteria to be able to replicate this technology and it is the sustainability of the model, based on the balance of income and expenses while operating the model. Revenues from waste collection combined with revenues from the recycled products can be fully offset in order to maintain regular efficient operation of the plant.

In addition, the project model also meets the most important criteria to be able to ensure the feasibility of replication in other locations, as follows:

- Technology has thoroughly handled the amount of generated wastes and to meet the current environmental standards and regulations;
- Partly reuse of organic humus (for soil improvement) and partly recycling of wastes, ... contributing to maintain the operational costs;
- Low landfill percentage, about 15.24% (possibly lower if ash is partially reused for farming purposes for some crops, such as cassava plants and pumpkin ...);
- No leachate generated, so no extra cost for leachate treatment;
- System of machinery, equipment and technology is not complicated, can be made locally, easy to operate, maintain and replace when there are damages, ... matching qualified operators locally.

The project has successfully developed a pilot model of management and treatment of domestic solid wastes in the rural areas with the capacity of four tons/day that can be applied in residential areas (communal or inter-communal) and has been applied successfully in Hồi Ninh commune, Kim Sơn district, Ninh Bình province. The project has launched a technology solution for handling domestic solid wastes in the rural areas which is relatively consistent with the conditions of Vietnam; it has many advantages for replicating the model to other regions.

The result of the project is an important solution to solve one of the criteria of New Rural Program, which is the criterion of environmental sanitation (waste problem) and thereby contributing to the success of the implementation of the National Strategy on managing solid wastes to 2025 and vision to 2050■

HÀ NỘI TO HAVE NATION'S BIGGEST WASTEWATER TREATMENT STATION

The Hà Nội Provincial People's Committee started the construction of Yên Xá Wastewater Treatment Plant. The 16,293 billion VND (800 million USD) Project got ODA from the Japan International Cooperation Agency (JICA). It covers Yên Xá-based Wastewater Treatment Plant and collecting system, serving to improve Hà Nội's environment.

The Plant has a design capacity of 270,000 m^3 per day, including a system which collects wastewater along the Tô Lịch and Lừ rivers and a part of the Nhuệ river with a total length of 52 km.

The Project will serve for seven districts of Hà Nội city namely Ba Đình, Cầu Giấy, Thanh Xuân, Đống Đa, Hoàng Mai, Hà Đông, and Thanh Trì and put into operation in 2019. The Project is of great significance in improving the environment and pollution at Tô Lịch, Lừ, Sét, Nhuệ rivers; transform local landscape, urban ecology, and develop sustainable growth in Hà Nội.

PHƯƠNG HẠNH

HÀ NỘI TO INSTALL 20 NEW AIR MONITORING STATIONS

Hà Nội city is preparing to install an additional 20 air monitoring stations, municipal. Nine of these will be at major intersections and nine others in crowded urban areas, the installations would assist agencies in issuing timely air quality warnings to residents.

There are six air monitoring stations in Hà Nội, but only two - stations on Nguyễn Văn Cừ street and another on Pháo Đài Láng street - are operational. One station was installed in the office of the department on Phạm Văn Đồng street in 2002, but it has not worked since 2010. The machine was outdated, and it was hard to replace faulty parts after it broke down. Other idle stations are in the Hà Nội University of Science and in the Institute of Environmental Science and Engineering. While the installation of 20 additional air monitoring stations was imperative at the moment, relevant agencies should allocate enough funds for their operation.

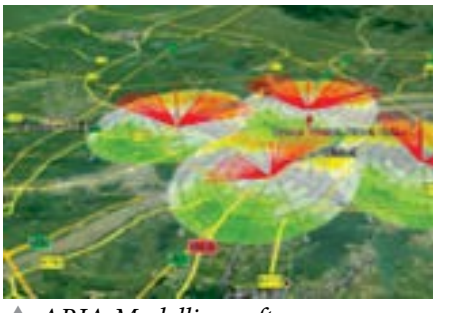
AN CHI

GOLDEN BRIDGE: GOLDEN CONNECTION BETWEEN FRENCH WORLD-LEADING ENVIRONMENT AND METEOROLOGY CORPORATIONS AND VIETNAMESE PARTNERS

Since the establishment in 2007, after almost 10 years, Golden Bridge (GB) has been well known as a "bridge" connecting prestigious international technology corporations from L'Hexagone ("the Hexagon") with the partners in Vietnam in fields of environment and meteorology.

▲ *ENVIRONNEMENT S.A air quality monitoring system*

In ambient air quality monitoring, GB is the exclusive partner of ENVIRONNEMENT S.A in Vieej, providing automatic air quality continuously monitoring equipment and stations, and data acquisition and management software. ENVIRONNEMENT S.A is one of the world-leading manufacturers, also the pioneer in Europe, specialising in complete solutions for monitoring ambient air, emissions, engine gas, dioxin and radiation. So far, ENVIRONNEMENT S.A has been supplied over 15 thousand air quality analysers and installed more than 500 air quality monitoring networks over the world.



▲ *ARIA Modelling software*

Also, in air pollution modelling and forecast, GB is the official partner of ARIA TECHNOLOGIES - who provided air quality management solutions for big cities, such as Paris (France), Rio de Janeiro (Brazin) or Beijing (China), by using modelling software.

▲ *LEOSPHERE wind shear monitoring equipment*

Having LEOSPHERE as a close partner, GB can provide customers such comprehensive solutions for air quality monitoring. LEOSPHERE is the global leader in supplying aerosol monitoring equipment using the cutting-edge technology LIDAR. For the past few years, LEOSPHERE has been perceived as the leading supplier of wind shear monitoring system for airport management with around 200 systems manufactured per year.

▲ *METEOMODEM RobotSonde*

In meteorology, GB has been chosen as the exclusive representative of METEOMODEM - a fledgling company who have fully justified its leading position in the field of upper-air observation equipment manufacturing.

In September 2016, as to firm up the position in technology transferring, GB signed the newest exclusive-representative contract with METEORAGE - the world leader in lightning detection network and lightning risk prevention solutions. METEORAGE services have been provided in many countries, including France, Switzerland, Belgium, United Kingdom or Netherland■

KẾ KHA

Implementing socialization model in craft village environmental pollution treatment in Hà Nội

With the increasing migration as well as rapid development of craft villages, the environment of Hà Nội is facing urgent pressures. Therefore, Hà Nội is developing strategies and planning for environmentally concern craft villages, particularly craft villages in urban areas and crowded residential areas. Accordingly, Hà Nội will invest more than 13,000 billion dong in pollution treatment in 44 craft villages working on agri-food processing; the investment will be implemented from now to 2020. In addition to investments by the State budget, Hà Nội promotes the socialization in environmental protection.

▲ *Hà Nội Secretary of Party's Committee Hoàng Trung Hải, Minister of Natural Resources and Environment Trần Hồng Hà, Chairman of Hà Nội People's Committee Nguyễn Đức Chung and Delegates at the launching of the Cầu Ngà Craft Village Wastewater Treatment Factory*

THE ENVIRONMENT STATE OF CRAFT VILLAGES IN HÀ NỘI

According to statistics of the Hà Nội Department of Industry and Trade, there are currently more than 1,350 craft villages and villages have different manufacturing types including food processing; animal husbandry, slaughtering; dyeing; construction material production; refuse recycling; craft arts, etc. Craft villages have contributed to reduce poverty, improve livelihoods, and attract labourers and played important roles in the socio-economic development of the locality. However, environmental pollution (air, noise, water, solid waste, etc.) in craft villages is at an alarming rate, causing negative impacts on human health, typically in three craft villages: Dương Liễu, Minh Khai, Cát Quế (Hoài Đức district) which produce noodle products from cassava and arrowroot and discharge, on average, about 13,000 m^3 wastewater daily. All wastewater is discharged directly to the drainage and channel system of the commune before flowing to Nhuệ and Đáy rivers. The concentration of organic pollutants in wastewater such as COD, BOD_5, NH_4^+, coliform is many times higher than the limit and the odour is very bad. In some places, cassava and arrowroot resides pile up, disrupting the surrounding beauty and environmental sanitation.

In craft villages, manufacturing activities are at small scale (mostly households) and scattered in residential areas; production activities mix with domestic activities; manufacturing technologies are manual and backward. There are almost no waste, wastewater and air collection and treatment systems. Whereas investments in environmental pollution treatment system in craft villages are limited as households do not have enough budget to invest in the craft village solid waste and wastewater treatment systems.

To overcome and to improve the environmental pollution status in craft villages, Hà Nội has reviewed and developed a list of environmental polluters which are inappropriate with the planning and promulgated the craft village environmental protection action plan in Hà Nội during 2016 - 2020. In addition to prioritising budget for environment, Hà Nội also promotes the socialisation of environmental investments and services supply, promotes research and application of scientific and technical advance in environmental treatment. However, the environment of craft villages is facing many difficulties due to limited resources from the city's budget. Whereas, the mobilisation of socialisation sources is ineffective as the investments in this area are very high but with low benefits; therefore, enterprises are often not "interested".

Socialisation model of craft village environmental pollution treatment in Hà Nội

In fact, by now, only one enterprise invests in craft village wastewater treatment which is Phú Điền Investment, Construction and Trade Joint Stock Company (Phú Điền Company). In December

▲ *Delegates visit the Wastewater Treatment Factory*

2015, the Company has invested in construction of the Cầu Ngà Craft Village Wastewater Treatment Factory project for wastewater treatment of three craft villages Dương Liễu, Minh Khai, Cát Quế, with 100% fund from the enterprise. This is a pilot project on socialisation mobilisation in craft village environmental pollution treatment according to the orientation of the city.

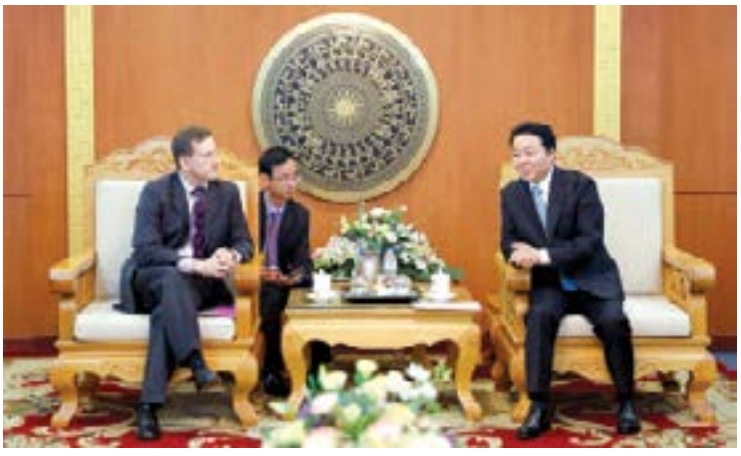
With close direction of authorities at different levels and guidance of the Hà Nội Department of Natural Resources and Environment, after 10 months of construction, on 8th October 2016, the Cầu Ngà Craft Village Wastewater Treatment Factory has completed with the total investment of 330 billion VND, with an area of 9,397 m^2. The design capacity of the factory is 20,000 m^3/day, using closed biological treatment technology which ensures no secondary odour; the facility is fully automatic and imported from Europe and the wastewater collection system is closed and synchronised. In the test operation on 15th September 2016, the water after treatment of the Factory achieves the regulation of QCTDHN 02:2014/BTNMT of the Ministry of Natural Resources and Environment on industrial wastewater in Hà Nội; the water after treatment can be reused for agriculture irrigation purposes. This is also the first large-scale craft village wastewater treatment system in Hà Nội applying green technologies and energy saving; solar energy batteries are installed on the surface of biological treatment tanks for energy generation of 200 KW/day, providing electricity for the whole factory.

The investment of Phú Điền Company in the Cầu Ngà Craft Village Wastewater Treatment Factory not only reduces environmental pollution and enhances the livelihood quality of local people, but also plays important roles in the socialisation of environmental protection in craft villages. This is a typical example for other enterprises to have the "courage" to invest in and to contribute to the city in addressing environmental pollution in craft villages.

However, to promote the socialisation of environmental protection in craft villages in Hà Nội, the city needs to develop mechanisms and incentive policies for socialisation models in environmental treatment in craft villages, creating the necessary legal platform to promote enterprises to invest in environmental protection of craft villages. At the same time, it's necessary to develop and implement environmental protection agreements, conventions and commitments, mobilize communities to contribute resources in environmental pollution treatment in craft villages; implement specific model on environmental protection socialisation for each craft village type, linked with socio-economic and cultural activities of the craft village, from which to expand the socialisation model in environmental pollution treatment of craft villages across the city, creating the joint strength in environmental protection of the Capital.

P. LINH

Việt Nam - France strengthen cooperation to cope with climate change



▲ *Minister of Natural Resources and Environment Trần Hồng Hà received newly appointed France Ambassador to Việt Nam Bertrand Lortholary*

Minister of Natural Resources and Environment Trần Hồng Hà appreciated the support of the France Government through the implementation of projects in the field of climate change, marine environment, remote sensing applications for monitoring natural resources and environment in Việt Nam; support and close cooperation with the Ministry of Natural Resources and Environment (MONRE) and enhancing the State management capacity in this field.

According to The newly accredited Ambassador Bertrand Lortholary, France would share its experience with Việt Nam in climate change via the French Development Agency (AFD), which operated seventeen relevant projects worth a total of 525 million EUR across Việt Nam during the 2006 - 2010 period. He said, France would work with the Hà Nội's authorities to implement an air quality monitoring system in the capital city. The air monitoring project would feature the signing of contracts providing services between Hà Nội and France companies, recommendations on controlling the air quality in Hà Nội and policies to improve the situation.

The two sides are considering raising the level of support for the SP-RCC Program, increasing the value of the 6th AFD's loan for SP Program -RCC 2016 to 100 million EUR. The loan is expected to be disbursed in 2017 - 2018 with total amount of 50 million per year for the goal of development. Also in the reception the two sides exchanged about support of AFD and the France World Environment Fund (FFEM) for the MONRE on "Establishing a mechanism to manage marine environment of Hạ Long Bay, Hải Phòng and Bái Tử Long" with a value of 1.401 million EUR, of which the grant is 1,260,000 EUR and the rest is corresponding capital.

The Minister thanked the help France Government for Việt Nam in the areas managed by the MONRE in implementing the Paris Agreement on climate change, including building institution - a preparation for Việt Nam to implement INDC.

MAI HƯƠNG

HÀ NỘI RECEIVED 120,000 € SUPPORT FOR ENVIRONMENTAL MANAGEMENT

Lately, Chairman of Hà Nội Provincial People's Committee Nguyễn Đức Chung had a meeting with Minister of State Development and French Language - Mr. André Vallini in Hà Nội on cooperation in the field of environment and air quality in the city.

At the meeting, Mr. André Vallini and Mr. Nguyễn Đức Chung witnessed the signing of "Contract of advisory services and technical assistance project studying and evaluating the environmental status of the air in Hà Nội" between the Department of Natural Resources and Environment and Airparift Association. The Project was supported by the French Embassy and the French Development Agency (AFD) a funding of 120,000 € deducted from the Fund for Research and Strengthening (FERC) of AFD.

City Chairman said that air pollution problem in Hà Nội now is at alarming level, it need urgent measures to improve. Therefore, Airparift's air monitoring Project is meaningful to Hà Nội in particular and Việt Nam in general. The Project shows strong commitment and concrete actions of the French Government in the development of Việt Nam - France relations.

To implement this project, Hà Nội Provincial People's Committee assigned Department of Natural Resources and Environment to actively coordinate with the French Development Agency and the French technical experts implementing the survey and assessing the current situation of air environment in 20 approved locations.

On this occasion, AFD on climate change has a plan with Hà Nội to support urban planning, sustainable development as well as address issues related to global warming.

ĐỨC ANH

ASEAN Reaffirms Call for Clean and Green Environment

The 27th Meeting of ASEAN Senior Officials on Environment (ASOEN), which was held back-to-back with the 38th Governing Board Meeting of the ASEAN Centre for Biodiversity (ACB), kicked off in Nay Pyi Taw on 1st August, 2016. Participants from all ASEAN member states attended the four-day meeting.

During the opening, U Khin Maung Yi, the Permanent Secretary of Ministry of Natural Resources and Environmental Conservation of Myanmar reaffirmed that ASEAN Vision 2025 calls for clean and green ASEAN to achieve sustainable development by ensuring protection of the region's environment. The ASEAN Socio-Cultural Community (ASCC) Blueprint 2016 - 2025 also stressed the importance of sustainable development by identifying many key indicators such as sustainable climate as well as sustainable consumption and production.

The meeting focused on the current pressing environment issues of the region. The key outcomes of the meeting include the final drafts of the ASEAN Joint Statements on Biological Diversity and Climate Change. Both statements will be presented to ASEAN Leaders at the upcoming ASEAN Summit in Vientiane, Lao PDR in September, 2016. The statements would ensure ASEAN's strong commitment on conserving biodiversity and on synergizing the efforts to tackle climate change issue. The Joint Statements will be read at the 13th meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 13) in Cancun, Mexico in December, 2016, and the United Nations Framework Convention on Climate Change COP 22 in Marrakesh, Morocco in November, 2016 which are both global stages of highlights in the environmental field.

The Bái Tử Long National Park of Việt Nam was also endorsed as the 38th ASEAN Heritage Park.

QUANG NGỌC

ADB TO FUND USD 1 BILLION CLEAN WATER PROJECT

The Asian Development Bank (ADB) has approved a USD 1 billion fund to improve access to clean drinking water in Việt Nam.

The assistance is part of an investment project, involving the ADB, the Vietnamese Government, along with other development partners, totaling about 2.8 billion USD. The Program will help water companies improve and expand clean a water supply in some of Việt Nam's largest cities through the installation of new pipelines, as well as repairing and extending existing infrastructure. It will also enhance the operational management and commercial viability of water companies.

Another goal of the water investment Program is to reduce water loss in urban areas to less than 20% by 2020. At present, four out of ten families living in Việt Nam's largest cities are not connected to a central water system, and only one in three towns have any form of piped water supply. Many piped water systems in urban areas are in urgent need of upgrades.

ADB is providing 138 million USD for the Program's first project in Hồ Chí Minh city, where many poor households are not yet connected to the municipal water system, yet are paying almost twice the official water tariff. **QUỲNH ANH**

Korea Environmental Industry & Technology Institute (KEITI) with 5 years successful operation of Việt Nam Korea Environmental Cooperation Center in Việt Nam

As assigned by Korea Ministry of Environment (KMoE), Korea Environmental Industry and Technology Institute (KEITI) is responsible for the administration of the funds and supports provided for the development of environmental technologies, industry incubation, the promotion of environmental technology oversea's markets...

Recognized the fact that Việt Nam has been chosen by many large scale Korean companies to invest in and to operate their businesses, in late 2011, KEITI had inaugurated its representative office in to operate the Việt Nam Korea Environmental Cooperation Center (VKECC), an entity established by KMoE in order to strengthen the bilateral cooperation activities in the fields of environment between the two countries. During 5 years of its operation here in Việt Nam, KEITI has financed for the implementation of 11 projects with the total amount of 5 million USD to promote the application of advanced Korean environmental technologies in Việt Nam such as the installation of an AMS for upstream water monitoring in Cầu river (300 thousand USD from KEITI in 2015 - 2016) which is now operated by Thái Nguyên Department of Natural Resources and Environment (DoNRE), the donation of 300 arsenic romover water purifiers to the households of Bình Châu commune (Bà Rịa-Vũng Tàu) in 2015, the cooperative project on the construction of centralized water supply system for rural communes in Vĩnh Thanh district of Cần Thơ city (500 thousand USD from KEITI in 2013 - 2014)...

Besides the provision of equipments in environmental sectors, KEITI/KMoE has also strongly supported for the development of high quality environmental human resources for Việt Nam through the 2 year Master Scholarship Programs and short courses, study tours for Vietnamese officials and officers to study in Korean universities and Korean environmental management organizations respectively. Since 2013, KEITI has financed full scholarship for 5 officials from Ministry of Natural Resources (MONRE), 3 officials from Ministry of Planning and Investment (MPI) and 3 officials from Ministry of Construction (MoC) to study at master degree programs of famous universities in Korea such as Yeungnam University, the University of Seoul city. We believe that these young Vietnamese officials with the excellent academic results they gained in Korean universities will actively contribute in the strengthening of cooperation and experience exchange activities in the fields of environment between the two countries.

▲ *The Opening and Hand-over Ceremony - Automatic Water Monitoring Station to Thái Nguyên DoNRE (December, 2015)*

More and more Korean investors choose Việt Nam to invest in. By September, 2016, the total registered investment of Korean investors in Việt Nam has approximately reached 50 billion USD, making Korean become the largest FDI in Việt Nam. In comparison to the previous investment projects, the scope of Korean investment projects and companies invested in Việt Nam recently has been much lager and larger with more and more world famous companies such as Samsung, LG… participated in market and invested in less polluting and high-tech industries. This positive trend of changes in the scope of Korean investment projects and the participation of Korean world famous companies, the compliance of Korean investors with Việt Nam's environmental legislation will surely be improved significantly and effectively. Most of Korean investors well recognized that good environmental performance and the implementation of social responsibilities will contribute to the PR of their own image

▲ *Training workshop on Law on Environment Protection and guidelines provided to Korean enterprises and investors operating in Đồng Nai province (December 2015)*

and enhance their own competitiveness. Besides, there are more and more Korean investors directly contributing to the improvement of Việt Nam's environment through their investment in the fields of waste treatment and environmental infrastructure development. KEITI has continuously and closely work Việt Nam's environmental authorities to support Korean enterprises to ensure that their activities will contribute positively into the course of sustainable development of Việt Nam. Since 2014, when the new Law on Environment Protection was enacted, KEITI in collaboration with Vietnam Environment Administration (VEA) had supported local authorities to provide Korean investors and their workers with training workshops for the communication of new environmental legislation in order to enhance the environmental performance of Korean investment and to promote the application of advanced Korean environmental technologies in Việt Nam.

Like Republic of Korea before 1980s, since 1990, Việt Nam has been experienced with the rapid economic growth through the strong promotion of industries. However, Việt Nam has now been paying the expensive trade-off with social costs caused by environmental pollution. The development of good environmental legislation will help for environment protection. However, the enforcement of that good environmental legislation is more important to ensure that those regulations will be executed effectively and fully. In order to do that, economic aspects and benefits should be thoroughly considered to be integrated in environmental regulations. Korean policies and strategies on the greening its economy always emphasize the above mentioned purposes. Since 1990s, with the establishment of KMoE, Korean Government has set highest priority for the development of environmental industries and the technologies those help to minimize environmental pollution and to maximize the efficiency of resource consumption and resource saving. Annually, about 60 - 70% of KMoE budget (about 5.7 billions USD for 2015) has been allocated for the nurturing of environmental industries, the research and the development of environmentally-friendly, clean and resource saving technologies and the development of environmental infrastructures in localities as well.

In order to strengthen the performance of environmental technology promotion support, in 2016, KEITI's functions and scope of works had been modified in the Korea Environmental Industry and Technology Institute Act which was newly enacted in December 2015 and came into effect since 1st December, 2016. According to this new Law, KEITI will expand its funding activities to support for the researches on environmental technology and green management, oversea expansion of the environmental industry and technology, training and education of professionals for environmental industry/technology and green business, the development of criteria for certifying green products, promotion of green production/sale and green product distribution, policies exchange and researches, development of cooperation with developing countries in climate change mitigation and respond through the using the Climate Change Education Fund and Green Climate Change Fund. Certainly, with this updated law, KEITI playing the role of a government trade promotion organization in the field of green and environmental business in Việt Nam will also expand its scope of supporting activities in order to deepen and to strengthen the bilateral cooperation between the two countries in the fields of environmental protection in coming years.

KIM OANH

Some changes in green technology policies in Korea since 2008

Green technoly has been paid special attention to by the Government of Korea since 2008 when President Lee Myung-bak approved the National Vision on Green Growth, Low Carbon.

According to the Green Technology Committee of Korea, Green Growth (GG) will lead to environmental protection and creation of new industries as well as new jobs thanks to green technologies and clean energy (such as solar energy, tidal/wave/ ocean energy, and hydropower) as a replacement for fossil fuels (such as oil and coal)". In the umbrella Law on GG, Low Carbon of Korea, GG is defined as: "GG is the growth that achieves economic and environmental harmony, through saving and efficient use of energy and natural resources in order to mitigate climate change and environmental degradation; simultaneously promotes research on clean energy and green technology (GT) to ensure new growth motivation and create new jobs...". Through which, Korea has reiterated that GT is the focus of the national vision on GG and GT development towards creating new growth motivation.

In 2009, Korea has established comprehensive policies on GT research development. Since then, the role of GT in the economic development of Korea has always been highlighted; at the same time, GT policies have been improved.

Accordingly, since 2008, policies on GT have changed, amended and strengthened, and improved on previous period's shortcomings. In terms of the growth model, Korea has converted from the GG, Low Carbon model (during President Lee Myung-bak term) to the "New era of hope and happiness" vision with the innovative economy model (during President Park Geun-hye term); however, the core values and development orientations towards a green, environmentally - friendly economy model, emphasis on the role of GT, clean energy and maintenance of targets of emission reduction of the Korean Government are unchanged. A recent proof is that the Government of Madam Park has declared the target for greenhouse gas reduction in 2030 to be 37% compared to the BaU scenarios (following the target of 30% reduction in 2020 announced during the President Lee Myung-bak period). This declaration clearly illustrates enormous efforts of the new Government on following green targets that Korea has declared to the world. Therefore, this declaration has achieved positive response from the people and the international communities, at the same time, many researches suggest that the time under Madam Park's ruling will open a new era on GG (GG Era 2.0).

▲ *President Lee Myung-bak speaking at B4E, the Business for Environment Global Summit 2010 in Seoul Korea*

The foundation for maintaining these development orientations, including orientation on GT, is the operation of the GG Committee, which was previously under the President's command, and is currently under the Korea's Prime Minister's. Professor Lee Seung-hoon - Chairman of the Committee informed that: The Committee will strongly follow the GG Strategy of the previous Government; of which, subsequent policies will focus mostly on innovation, commercialization, production and export of green technologies, as well as relevant products and processes.

In addition, it could be seen that policies on GT are more insightful and focal. From the list of 75 technology nominees, Korea has selected 27 core green technologies for focal development (classification by time and focus level). Out of 27 core technologies, 10 core green technologies were selected in 2014, then Korea selected the top 6 core green technologies for development prioritization. With this focal and profound investment method, in the future, Korea will highly likely shorten the distance in technologies with developed countries.

In other words, in the past few years, there are changes on GT policies and these changes are necessary and appropriate with the development process. The President Lee Myung-bak period could be considered as the fundamental period - establishment of legal foundations (Law on GG, Low carbon), establishment of the domestic operating agency (GG Committee), establishment of the international operation organization (Global GG Institute), development of five-

Changes in GT policies of Korea:

15/8/2008 Publication of the GG, Low Carbon Vision 60th Liberation Day Anniversary	• Propose the "GG, low carbon" vision to be the national development model
1/2009 Establish the comprehensive policy on GG research and development National Science and Technology Committee	• Promote GT integration, expand fundamental research, green existing industries, explore future growth motivation, develop infrastructure for GT (selection of 27 core green technologies)
5/2009 Establish strategies for core GT development and commercialisation GG Committee	• Energy source technology, productivity enhancement technology, industry greening technology - environmental protection space and technology - natural resources circulation (classification of 27 core green technologies by time and focus level)
7/2009 Development of five-year plan on GG GG Committee	• Climate change response, energy independence, new growth motivation, living quality improvement and national image enhancement
2/2010 Selection of 10 core green technologies GG Committee	• New generation secondary battery, green PC, LED, high efficient solar battery, green car, smart electricity grid, new light water reactor model, fuel battery, carbon sequestration, advanced water treatment
8/2011 Second fundamental plan on sustainable development Inter-ministerial Committee	• Enhance the sustainability of the environment & natural resources, adapt and establish the climate change response system, enhance social equality and people health, enhance the sustainability of the economy and industry structure
12/2012 The 3th environmental technology and environmental industry nurture plan National Science and Technology Appraisal Committee	• Strategies for environmental technology development, strategies for environmental technology nurture, strategies for development of technology integration and environmental technology (5 targets, 16 core technologies)
2/2013 National task of the Government Inter-ministerial Committee	• Propose "New era of hope and happiness" vision to be the national development model
6/2013 Implementation plan of the innovative economy Inter-ministerial Committee	• Enhance the role of the innovative economy, create growth motivation, explore new technologies - new markets, enhance capacity for information technology and communication renewal…
2/2014 Three-year plan on economy reform Inter-ministerial Committee	• The economy is stable, dynamic; the economy is balanced between export and domestic demands
6/2014 Second five-year plan on GG GGCommittee	• Low carbon economic - social structure, implementation of the innovative economy through the integration of GT with information - communication technology…
7/2014 Strategy for core technology development to respond to climate change Ministry of Science, ICT and Future Planning	• Selection of six core green technologies

Source: GT Centre (2014), White Paper on GT Policy 2014

year Plan and 60 years vision… which lays the foundation for the GT development process. During the President Park Geun-hye term, based on existing foundations, the GT development converts from research to pilot application and expansion to commercialization, production and exports. For example, the pilot smart electricity grid system that was developed in 2009 in Jeju applies advances of the information technology into the existing electricity grid. With conducted researches, in the near future, Korea will convert to trials at commercial level. The first trial will be conducted in a big city then expanded to nationwide. Therefore, GT will develop towards "from lab to daily practice".

Currently, the GT development is a global trend and a highly promising potential market in the future. In terms of global and domestic context, Korea has proactively participated in the GT race with the hope to find new motivations for economic development in the upcoming period. This effort of Korea does not only contribute to stimulate the national economy but also show the responsibility of a responsible nation to the global threats.

In terms of policies, within less than 10 years, the Korean Government has created relatively adequate policies and legal foundations for future development orientations. For each development period, Korea established short-term to medium-term and long-term plans, with specific objectives to measure and assess the outcomes as well as to propose adjustments if needed. The development of a methodical policy method will definitely create conditions for green technologies of Korea to develop further in the future.

LƯƠNG HỒNG HẠNH

● UNDP to support environmental protection and climate change adaptation in Việt Nam

Lately, Minister of Natural Resources and Environment Trần Hồng Hà had a meeting with Ms. Pratibha Mehta, UN Resident Coordinator and UNDP Resident Representative.

At the meeting, Minister Trần Hồng Hà confirmed that the UNDP has been a strong partner in Việt Nam and highly appreciated the active support of UNDP and Ms. Pratibha Mehta personally to the Government of Việt Nam in general and the Ministry of Natural Resources and Environment (MONRE) in particular in the field of Natural Resources and Environment. UNDP supports have contributed to meeting targets on environmental protection and climate change response.

Ms. Pratibha Mehta expressed her desire to continue to better coordinate with Việt Nam as well as the MONRE to solve the problems in Việt Nam, especially in natural resources management, environmental protection and climate change adaptation.

Minister Trần Hồng Hà and Ms. Pratibha Mehta discussed issues of mutual interest including remediation information from the recent environmental incident causing fish dead in four Central provinces of Việt Nam; implementation status of the Paris Agreement on climate change in Việt Nam; workshop on climate change with the participation of the President of Intergovernmental Panel on Climate Change (IPCC) and Consultation Workshop on Paris Agreement Implementation Plan; and plans and measures to improve the effectiveness and efficiency of environmental protection in the future.

In the next time, UNDP will support the MONRE to develop institutions to cope with environmental incidents through the project "Mitigation of Future Environmental Crisis: Policy Reforms informed by Mass Fish Deaths Disaster" and help Việt Nam to solve environmental issues and responding to climate change.

Minister Trần Hồng Hà informed that Việt Nam is trying to perfect institutions and policies to create a favorable environment to respond to climate change, including amending and updating the national policies, strategies and plans on climate change adaptation, socio-economic development; further regional coordination; and calling the participation of private sector in solving environmental issues.

DUY BẠCH

● World takes bold steps to protect wildlife, including elephants, rhinos and tigers

At the 17th meeting of the Conference of the Parties (COP17) closed in South Africa on 4th October, 2016, Governments united behind a series of tough decisions to provide greater protection to a host of threatened species and bolster efforts to tackle soaring levels of poaching and wildlife trafficking. Specifically, key decisions and announcements were made around species that are traded across the Greater Mekong Region, including ivory, rhino horn, pangolins and tigers.

Gathered in South Africa for the world's largest ever Wildlife Trade Meeting - COP17 to the CITES - more than 180 countries voted to maintain the international ban on trade in ivory and rhino horn, while adopting global bans on trade in pangolins and African Grey parrots. Countries at the Conference also called on nations where there is a legal domestic ivory market that is contributing to illegal trade to take all necessary legislative, regulatory and enforcement measures to close their markets as a matter of urgency.

The Conference also imposed strict regulations on the trade in silky and thresher sharks, devil rays, as well as on all species of rosewood tree.

Among a record-breaking number of issues on the agenda, delegates agreed to a series of significant steps to ramp up the global response to illegal and unsustainable wildlife trade.

Along with calling for the closure of domestic ivory markets that are contributing to illegal trade, countries backed the CITES-led National Ivory Action Plan (NIAP) process, which identifies countries that are weak points in the illegal ivory trade chain, and is central to efforts to halt the ivory trade.

Just as importantly, countries adopted enhanced traceability mechanisms that are at the heart of efforts to develop sustainable fisheries for sharks and rays, and tightened up rules relating to tiger farms and trade in captive-bred animals, which will help prevent the laundering of wild-caught animals.

For the first time, the Conference also officially de-

bated and adopted resolutions on a number of critical crosscutting issues relating to illegal wildlife trade, including corruption and reduction of consumer demand for threatened wildlife and their parts.

The Việt Nam's Government pledges to eradicate illegal wild animal trading and make every effort to combat all wildlife-related crimes. With its efforts made over the past ten years, Việt Nam has succeeded in cutting the demand for rhino horns, with a reduction of 38 percent in the last three years. **NAM HƯNG**

● JICA supports to protect Hạ Long Bay environment

The second phase of a project funded by the Japan International Cooperation Agency (JICA) has made practical contributions to protect environment of Hạ Long Bay - a UNESCO - recognised World Natural Heritage.

The second phase of the Project, part of JICA's technical cooperation program, has been implemented from November 2013 to September 2016.

With a total investment of 60 million JPY (580,000 USD), the Project has helped build a system to collect rubbish on the bay and bring it to the shore to be treated and build a model on environmental education to raise public awareness of preserving the heritage site.

Under the Project, a ship running on bio-fuel was built and handed over to the Hạ Long Bay Management Board for the collection and transport of rubbish, while 3,500 mangrove trees were planted and a textbook on environmental education was compiled and has been provided for local students. Additionally, more than 4,000 leaflets on the Hạ Long Bay environment were also delivered. Three delegations of Quảng Ninh officials have been sent to Japan's Sakai city for training.

HỒNG NHUNG

● Japanese Company to develop solar electricity in Bình Phước

Japan's WWB Corporation will build a solar power plant in Đông Phú district, Bình Phước province, with area of 50 ha. The Plant has a capacity of between 75 and 100 MW.

The Province welcomes the Project and pledges to create all possible conditions for the investor to implement the project. Việt Nam has enormous solar potential, especially in its central and southern parts. It has average solar irradiation of 4 - 5 kWh/m^2/day, which is comparable to Thailand and the Philippines, which are more developed solar markets in the region, as well as to mature international markets like Spain and Italy.

The Vietnamese Government has recognized this potential and aims to significantly increase renewable energy production including solar power.

Under its newly revised Power Development Plan for until 2030, which includes ambitious development targets for renewable in general and solar energy in particular, the capacity of solar photovoltaic (PV) shall increase from around 7 MW now to 850 MW by 2020 and 12,000 MW by 2030.

PHƯƠNG LINH

● Germany to help Việt Nam deal with wastewater

The Germany - Việt Nam Water Forum held in Hồ Chí Minh city on 9th November, 2016 discussed ways the two countries could cooperate in water, wastewater and urban resilience projects in order to enhance resource efficiency. The Forum also introduced the new German Development Corporation (GIZ) and Ministry of Construction publication "Resilient Cities in Việt Nam: A Guide for Planning Urban Environment Programs".

The publication reflects the experiences gained during long years of operating in the urban environment sector in Việt Nam. Together with a high urbanization rate, climate change, frequent and serious urban floods and increased pollution pose significant challenges for the water and wastewater sector in Việt Nam.

To address these challenges, GIZ through the Wastewater Management Program and the Flood Proofing and Drainage for Medium-sized Coastal Cities in Việt Nam for Adaptation to Climate Change Program is supporting national and provincial Governments to establish a legal and policy framework for the urban drainage/sewage and flood risk management sector. The aim is to build resilient cities that can withstand the negative impacts of climate change.

In recent years, the Việt Nam Water Supply and Sewerage Association (VWSA) has focused on human resources development, technology promotion and policy advocacy. It has been strengthening cooperation with GWP, GIZ and other donors and international organizations to fulfil its objectives. In particular, VWSA is working closely with GWP in fostering cooperation between German and Vietnamese businesses as well as investment promotion, technology transfer, knowledge and experience exchange. The Forum was sponsored by the VWSA in partnership with GIZ and the German Water Partnership (GWP).

MINH VIỄN

VIỆT NAM'S FIRST WASTE-TO-POWER SYSTEM LAUNCHED IN HÀ NỘI

Việt Nam's first waste-to-energy system capable of generating 1,930 kW of power by treating 75 tonnes of industrial waste per day was launched in Hà Nội's suburban district of Sóc Sơn.

The Project, jointly implemented by the Hà Nội Urban Environment Company and Japan's New Energy and Industrial Technology Development Organization (NEDO), has Japanese technology and equipment. It has a total investment of 645.2 billion VND, including 173 billion VND from Hà Nội's budget. This is the first project in Việt Nam and the region that uses modern waste treatment process.

▲ *The firts waste energy system in Việt Nam*

The Project, part of the Green Aid Plan of Japan, is significant for Hà Nội where the volume of industrial waste has increased and dumping ground is narrower. After trial operation until December 2016, the system will be officially run and connected to the national power grid. Materials for the system include solid waste, fabrics, plastics, dead animal body, among others. Meanwhile, air and water released from the system are cooled and filtered before releasing into the environment.

NHẬT MINH

HỒ CHÍ MINH CITY TO INVEST 3 MILLION USD TO BUILD FOUR AIR MONITORING STATIONS

▲ *A broken-down air monitor station in Hồ Chí Minh city*

Many air monitoring stations in Hồ Chí Minh city have not been working well for the last four years, so the City wants to build new stations to monitor increasing air pollution.

The Hồ Chí Minh city Department of Environment and Natural Resources has proposed building 9 automatic air monitoring stations in the City.

It is an urgent need to build at least four stations first, at a cost of 78 billion VND (over 3 million USD).

Currently, the City is using a semi-automatic air monitoring system, which works from 8 - 9 am and 3 - 4 pm, which is not suitable because trucks are not allowed to run in the City during this time. In addition, the air monitoring results using a semi-automatic method does not provide comprehensive data, causing difficulty to assess the current state of water and air pollution in the City.

Previously, the Department of Natural Resources and Environment also proposed to the city to build 27 automatic monitoring stations and 225 semi-automatic stations. The construction is expected to begin from now to 2020, at a cost of around 495 billion VND (23 million USD).

THANH TUẤN

ĐỒNG NAI KEEN ON CLEAN INDUSTRIAL PRODUCTION

The Southern province of Đồng Nai targets to have 50 percent of local enterprises applying clean production process and saving from 8 to 13 percent of energy and material consumption per product unit by 2020.

According to Vice Chairman of the Đồng Nai Provincial People's Committee Trần Văn Vĩnh, to realise the target, numerous incentives have been offered to lure investment in hi-tech industries, such as electric-electronic industry, mechanics, manufacturing, chemicals, biotechnology and supporting industry. Investments have also been poured to improve productivity and product quality into the sectors of food processing and beverage, garment and textile, footwear, wood production, construction material, among others.

Besides, the clean production process has been applied in the sectors with a high risk of environment pollution. Đồng Nai province is home to 32 industrial zones, covering an area of nearly 10,000 ha. Twenty nine of them have been operated, drawing 1,396 projects from 42 countries and territories worldwide, 73 percent of them are foreign ones.

VŨ SINH

Cambodia to overhaul entire system of environmental governance

▲ *The Government of Cambodia will create new environmental code and modernize Ministry of Environment in bid to tackle raft of environmental threats*

Cambodia has witnessed a remarkable period of growth. Its economic expansion has meant that Cambodia is rapidly becoming a lower middle-income country, an achievement that is lifting millions of people out of poverty.

Yet, this rapid pace of economic growth has brought with it a host of environmental problems. The rapid degradation of natural resources, increasing levels of water and air pollution and the growing amount of solid waste in urban areas continue to damage the environment and harm human health. The threat from disasters triggered by climate change, such as drought and floods, is also on the rise.

Cambodia has struggled to address these challenges. Historically, the country has ranked among the world's poorest performing when it comes to protecting the environment. Acknowledging the need to act, the Cambodian Government has decided to reform its entire environmental governance system. It aims to transform its Ministry of Environment into a more professional, modern and efficient organization. It will also seek to create a new legal framework for environmental protection and natural resource conservation.

According to Dr. Say Samal, Cambodia's Minister of Environment, the transformation of Cambodia's environmental governance is an urgent priority and a major step forward for Cambodia that aims to achieve the new Sustainable Development Goals.

Dr. Say Samal said: "With these new measures we will ensure that policies can deliver on the multiple objectives of environmental protection, sustainable natural resource management and our people's well-being. This will ultimately lead to a greener, more equitable and more sustainable society".

The United Nations Environment Programme (UNEP), through the SWITCH-Asia Regional Policy Support Component will work with United Nations Development Programme (UNDP) on the reforms, the foundations of which are expected to be finalized in December 2016.

UNEP, which already works to strengthen environmental policies in other Asian countries, will provide financial resources and technical expertise to help shape the way Cambodia tackles the environmental challenges that confront it.

The reform of Cambodia's environmental governance system will lead to the greater conservation and protection of vital resources, such as fresh water. The use of water in agriculture is set to expand dramatically as Cambodia continues to convert more land to farmland, which requires large-scale irrigation. This will place an immense burden on the country's fresh water supply.

The reform project, which UNDP will facilitate, will be comprised of three pillars: modernizing the Campuchia Ministry of Environment, establishing the National Council of Sustainable Development (NCSD) and developing a new environmental code.

UNDP Cambodia, USAID, Japan, and UNEP will also help the Ministry of Environment create a tool that improves the mapping of the Cambodia's rich ecosystems.

Mangroves play an essential role in the lifecycle of many marine organisms. They serve as spawning or nursery grounds for several commercially critical fish species. These ecosystems also play an essential role in protecting the coastline by providing a buffer against climate change-related sea level rise, cyclonic activity and storm surges. Mapping these vital resources will help the Government better conserve and protect them.

UNEP will also provide advice to the government on a range of issues, including green urbanization, education and how to raise awareness about sustainable consumption and production.

The initiative will help policymakers in Cambodia make better decisions about the efficient use of land and the sustainable management of natural resources, helping them to identify parts of the country that are suitable for conservation, community involvement and development. The Project will also help the Government assess the costs and benefits of development in order to improve natural resource use and limit overexploitation.

UNEP believes that the SWITCH-Asia partnership with UNDP - the first of its kind - will lead to major policy changes in the country thanks to input from the government, NGOs, development partners, and representatives from local communities and indigenous peoples.

The activities under this cooperation agreement will help Cambodia integrate Sustainable Development Goal 12 (Ensure Sustainable Consumption and Production patterns) into Cambodia's national legal framework.

THANH THỦY

(UNEP source)

Harmonizing economic, social and environmental benefits for Vietnamese enterprises

At present, untreated wastes remain an urgent issue in environmental protection. To address this issue, many countries have shifted from a linear to circular economy for harmonizing economic, social and environmental benefits for enterprises. Environment Magazine interviewed Mr. Sasama Tomoyuki, Country Manager of Dow Company in Việt Nam on this topic.

▲ *Mr. Sasama Tomoyuki - Country Manager of Dow Company in Việt Nam*

✶***Circular economy is a relatively new concept in Việt Nam. And not all Việt Nam's enterprises fully understood the concept. Could you kindly brief us of the definition of circular economy? Why do we have to implement the circular economy in the current context of resources scarcity? Is it different from the traditional economy?***

Mr. Sasama Tomoyuki: The fact is that many of our planet's natural resources are increasingly in short supply - fresh water is scarce, fossil fuel supplies are finite and costs for businesses, Governments and society are becoming more burdensome. More than ever, it's clear we need to change our behavior and transition to a level of sustainable consumption.

Right now, we live in a linear economy where the goods we use every day are manufactured from raw materials, sold, used and then discarded as waste. Dow Company is leading the transition from a linear economy to one that redesigns, recycles, reuses and remanufactures to keep materials at their highest value use for as long as possible. As a result, we'll preserve our resources in a "circular economy" making the most of our natural resources. Applying the principles of a circular economy will allow us to optimize the use and reuse of resources and ultimately reduce the amount of waste that goes into landfills.

In short, the concept of circular economy could be understood as "it used to be, you start using the goods and end up with the waste. But now, you can start using the goods, and it's the beginning of a story that never ends. It's called a circular economy which is turning the goods of today into resources for tomorrow".

✶***In the context of the Việt Nam's economy, what are the benefits and challenges for the manufacturers when they execute the circular economy?***

Mr. Sasama Tomoyuki: One of the biggest benefits to promote the circular economy is to use re-

sources effectively, contributing to environmental protection and promoting sustainability which the Government of Việt Nam attached importance to sustainable development by a longer term strategy. However, the principle of circular economy is still relatively new in Việt Nam. To effectively move forward, the circular economy has to be promoted among various state agencies, communities and businesses. The process of changing from awareness of 3R (reduce, reuse and recycle) to behavior and action will take time. Furthermore, the implementation of circular economy requires technology and innovation to reuse resources effectively and efficiently which is not just good for the environment but good for the business competitiveness as well. According to the survey data of the Việt Nam's General Department of Statistics, more than 95 percent of Việt Nam's enterprises are small businesses which do not have adequate capital, human resources and innovation to apply the circular economy principle.

✶***As a chemical manufacturer, what will Dow Company contribute to the implementation of circular economy initiative?***

Mr. Sasama Tomoyuki: The chemical industry plays an important role in the society because it's products are essential to human progress. Specifically, the chemical industry is providing essential materials to the manufacturing sector to create many useful and indispensable products for consumers such as medicines, plastics, electronics, synthetic fabrics, petrochemical, petroleum, chemicals used in agriculture as fertilizers and crop protection. In addition, the chemical industry also supports other industrial sectors, not just consumer goods.

Dow Company is not only a leading chemical manufacturer, but also a pioneer scientific and solution provider company that addresses today's Việt Nam's challenges (supporting industries, limited access to clean and safe drinking water, climate change, sustainability and productivity). Transitioning to a circular economy is not only vital to the preservation and protection of our planet's natural resources, but also to the success of businesses in Dow Company. According to the Ellen MacArthur Foundation, circular supply chains that increase the rate of recycling, reuse and remanufacturing could generate more than 1 trillion USD a year by 2025. Because of our leadership position in the manufacturing of materials for use in plastic packaging and water solutions, in particular, we have a unique opportunity to take a leading role in supporting the development and implementation of the circular economy, taking into account a product's lifecycle - from creation to use to disposal - in everything we do and create. Therefore, we will advance a circular economy by delivering solutions to close the resource loops.

Currently, acting as a Co-Chair of Việt Nam Business Council for Sustainable Development (VBCSD), Dow has been actively contributed to the sustainable development of Việt Nam through VBCSD's work plan activities and the Việt Nam Corporate Sustainability Forum to help the Việt Nam's business community better develop their business in a sustainable way. Significantly, Dow Company also has been sponsoring the "Cleaner Production and Waste Management" training program which is part of circular economy principle in the past 3 years with more than 2,000 participants.

✶***Dow Company has been successfully executing some circular economy projects. Could you kindly share some best practices?***

Mr. Sasama Tomoyuki: We are already taking great strides to help facilitate the world's transition to a circular economy, including a few of the following key initiatives and technologies that convert items formerly thought of as "waste" into new products and services:

- Through the Energy Bag Pilot Program in Citrus Heights, California, Dow helped turn 6,000 pounds of previously non-recycled plastic waste - juice pouches, candy wrappers and plastic dinnerware - into 512 gallons of fuel.
- Through a public-private partnership, Dow Terneuzen in the Netherlands, our largest chemical processing plant outside of the U.S., reuses 30,000 cubic meters of municipal wastewater each day to generate steam and supply manufacturing plants. Dow Terneuzen has reduced its energy use by 95 percent compared to the energy cost needed for conventional desalination of seawater - that's the equivalent of reducing carbon dioxide emissions by 60,000 tons each year. By 2020, Dow Company aims to entirely eliminate its reliance on freshwater at Terneuzen.
- Dow's SAFECHEM system, recognized by the United Nations Environment Program for environmental innovation, is a closed-loop cleaning solution that reduces the solvents needed in high-precision metal surface cleaning and dry cleaning applications up to 98 percent.

▲ *The Conference "The circular economy: a new approach to enhance competitiveness, reduce waste in environment" was held in Hà Nội*

✶In the context of resources scarcity, ethics and safety as well as the green house effects, it seems that the execution of circular economy becomes more important and inevitably to every nations. However, the implementation of the circular economy may be more costly than others. In addition, Việt Nam is lack of capital and human resources. For Việt Nam, do you have any advice? Can you share the Company plan in Việt Nam to help the Small Medium Enterprises execute the circular economy?

Mr. Sasama Tomoyuki: I would like to emphasize that transitioning to a circular economy is necessary for society to move to a level of sustainable consumption. It is because materials formerly considered to be "waste" have the potential to be turned into new products and have other applications. Significantly, chemistry innovation enables waste material conversions previously unimagined. And Dow's science and innovation expertise is key to developing scalable solutions that will close loops in a circular economy. Dow Company has the opportunity to take a leading role in supporting the development and implementation of new technologies to drive the principles of the circular economy. Restorative by design, Dow Company solutions keep products and materials at their highest utility and value, enable service life extension and value ecosystems throughout their lifecycles.

For the time being, Dow Company is leading the blueprint to execute the 2025 Sustainability Goals, in which Dow Company will partner with other industry leaders, non-profit organizations and Governments to deliver six major circular economy projects over the next 10 years. In addition, Dow Company will also partner with other industry leaders, nonprofit organizations and governments to deliver three major projects that deliver solutions and provide a blueprint for the implementation of principles of the circular economy by 2020. By 2025, Dow Company and partners will implement three additional projects located at Dow manufacturing sites or directly impacting Dow businesses.

For Việt Nam, after these two workshops on circular economy and as a Co-Chair and an actively founding member of Việt Nam Business Council for Sustainable Development, we continue to support for organizing seminars on plastics recycle in Hà Nội, Đà Nẵng and Hồ Chí Minh city and other provinces to enhance the awareness of plastics recycle and promotion of 3R in Việt Nam.

Significantly, Dow products are essential inputs to many downstream and supporting industries in Việt Nam. As a key partner to Việt Nam's economic growth and prosperity, Dow Việt Nam always endeavors to add value to most of the country's advanced manufacturing industries. From energy-efficient building and construction materials, to semiconductors and advanced electronics, to food packaging and plastic applications, Dow's expertise and innovative solutions incessantly strive to address growing national and economic challenges and concerns while focusing on sustainability and safety. Dow Company is committed as "A Partner in Economic Growth, A Caring Member of the Vietnamese Community".

✶Thank you!

VŨ NHUNG *(Implemented)*

First-class Labor Medal awarded to FrieslandCampina Việt Nam

▲ *First- class Labor Medal granting Ceremony*

▲ *The Board of Directors from FVC Company at the Labor Medal Award Ceremony*

On 4th August, 2016, FrieslandCampina Việt Nam (FCV) was awarded the first-class Labor Medal by the State President for remarkable contributions to the Việt Nam over the past 20 years.

Since its first days in Việt Nam, the Company always stuck to the motto: "Building health foundation, connecting family members". The Company has launched over one billion high-quality dairy products of Dutch Lady, Friso and Yomost brands onto local market a year and contributed to nutrition care for Vietnamese people at all ages.

FCV has always made great efforts to create environmentally-friendly products. Accordingly, FCV's factories in two province Bình Dương and Hà Nam are invested with the most advance technology, automated management system, completed sewage treatment system, saving-energy measures and using clean energy sources to protect environment.

FCV strives for climate-neutral growth and wants to contribute towards Việt Nam's green future. FCV addresses environmental factors in the supply chain and aim to reduce environmental impact such as CO_2 emissions, water usage, and water wastage. In Việt Nam, FCV has reduced energy usage by 15%, water usage by 25% and CO_2 emissions by 40 % compared to 2010.

FCV is working on the innovation-driven creation of greater sustainability in both production chains and dairy farming.

The firm's sustainable Dairy Development Program (DDP) has effectively supported the agricultural sector, rural areas and the economy with the participation of over 4,000 households.

Other programs such as offering cows to help poor farmers have greatly contributed to the society through the Cow Bank Project founded by Việt Nam Red Cross Society. Since 2012, it has donated 240 cows to the project. The first cows donated to the north have given birth to calves which have been transferred to other needy farming households.

After 20 years in Việt Nam, FCV has become a company that grows and develops an ever growing family of employees, salesmen and farmers; over 8,000 members in size and a company that supports Việt Nam with meaningful programs.

The Dutch Lady brand's "Den don dom" (Firefly Lantern) social program to keep poor children from dropping out of school by giving scholarships to over 25,000 students has constructed 20 new schools in rural areas to create a better learning and teaching environment for children and teachers across the country.

Partnership with Jr. NBA, an international youth development program of the National Basketball Association (NBA), FCV aims to promote basketball and an active lifestyle among children, over 10,000 students at more than 400 schools across the country have benefited from physical exercises and nutrition care.

FCV General Director Arnoud van den Berg said: "The first-class Labor Medal was given to FCV for combining its business and sustainable development activities, guaranteeing that business growth goes in line with environmental protection and corporate social responsibility".

The first- class Labor Medal is a strong motivation for the Company to strengthen its commitment to economic development of Việt Nam, provide better nutritional products for local consumers, and improve the living standards of local people."■

QUỲNH HOA

Dung Quất Oil Refinery makes great effort in environmental protection

Dung Quất Oil Refinery (Quảng Ngãi province) has steadily been operating commercially and with absolute safety for the last 7 years. With an advanced waste water treatment system, the Factory's environmentally-friendly conditions meet Việt Nam's and international standards.

▲ *Chairman of BSR Nguyễn Hoài Giang at the Launch Ceremony of World Environment Day*

"FOUR NO"

The slogan of the Dung Quất Oil Refinery is "four no," which stands for no smoke, no dust, no noise and no workers. Three of these relate to the environment. The last one is connected with technology. The Factory currently has 1,500 workers; however, there are no passersby inside the Factory.

The Dung Quất Oil Refinery is considered a symbol of a highly automated enterprise. During working hours, every employee is busy at work. Despite being such a huge Factory, it is a peaceful place. The only place where once can see passersby is in the offices.

According to General Director of the Bình Sơn Refining and Petrochemical Co., Ltd (BSR) Trần Ngọc Nguyên, indicators of environmental discharge from this Factory are much lower than specified regulations. Currently, the Factory is applying Việt Nam's Environmental Standards (ISO 2009) in accordance with the current regulations of Việt Nam.

When asked about the "three no" related to the environment, Mr. Trần Ngọc Nguyên explains: "You can imagine, with such huge workshops, if we do not solve the problem of noise, all the workers will go deaf. Moreover, they will not be able to deal with the noise the whole day. The noise will also greatly disturb locals who live close to the Factory".

During the process of design and installation, the Factory was equipped with advanced technologies from industrialized countries, such as EEMUA 140 Noise procedure specification, EEMUA 141, API RP 521 and CONCAWE 87/59. Those people working in an environment with noise exceeding 85 dB (A) are required to use anti-noise cotton and earphones.

Engineer Nguyễn Quang Hưng of the Safety, Health and Environment Division said the Factory has four main items for environmental protection - electrostatic dust separators, residual fluid catalytic cracking (RFCC), sulphur recoveryunit 1(SRU1) and supplement sulfur recovery Unit 2 (SRU2), along with a wastewater treatment system. The BSR has invested 27.8 million USD in purchasing advanced technology for wastewater treatment from industrialized countries (G7).

To handle emission, BSR has installed proper technical equipment and an exhaustive gas treatment system. This system will collect all toxic gas and gas emissions to meet environmental standards and ensure air around the factory is clean. In particular, the chimney of the factory is built at a suitable height and installed with electrostatic precipitators to handle waste gas that contains high dust content. The Factory is also equipped with a sulfur recovery unit and analysis equipment for continuously analyzing the indicators of polluted emission from the chimney, such as NOx and SOx, thus helping operators monitor and make timely adjustments so that gas emissions do not exceed permitted standards. All waste discharged from the production process is handled carefully and strictly complies with the Law. The hazardous waste discharged from the production process is collected and stored. The Factory has two warehouses for storing hazardous waste temporarily, covering an area of 600 m^2 per each, as well as a 500 m^2 per each warehouse for storing industrial waste, which is where it is classified before being transferred to the contractor. In 2015, the Factory collected and handled over 414 tonnes of hazardous waste and 8,225 m^3 of non-hazardous waste.

INITIATIVE TO CLEAN ENVIRONMENT

Apart from purchasing advanced technology to deal with environment pollution

at the Dung Quất Oil Refinery, the entire staff of the Factory has played an important role in preserving the environment. If the advanced equipment was handed over to those who are irresponsible and have a lack of awareness, the environment would remain polluted. In addition to managerial works, to better handle environmental pollution, the Factory's staff never stops learning and brings into full play their innovations and technical improvements, thus also helping save money for the State budget and minimizing pollution threats. Notable are the initiatives made at the electronic workshop, which has demonstrated great responsibility in environmental protection.

This workshop is installed with four steam boilers. During normal operation, three boilers are in operation and the fourth is ready to replace any in case of an incident. Two boilers are installed with Forced-Draft Fan (FD Fan) operated by steam turbine. Nearly 15 tonnes of HP/01 FDF steam is used and 15 tonnes of low-pressure steam is generated. Two FDF-installed boilers and one motor-driven fan boiler are in operation for three month annually.

During the operation, total amount of low pressure steam generated from steam turbines is much higher. Thus, a low-pressure steam is discharged into the environment. How to minimize this volume discharged into the environment is a significant question for the Factory's staff. To solve this problem, a project to minimize the maximum amount of low-pressure steam discharged into the environment from the turbines has been implemented.

Master Nguyễn Ngọc Thanh and his colleagues have successfully studied and applied the Project, saving 22 billion VND for the Factory per year.

It is not as simple as one thinks, especially when three boilers are in operation simultaneously with three condensate pumps. The three condensate pumps are also the "culprit" discharging waste steam into the environment. Therefore, engineers have to switch from using condensate pumps to a motor-driven operation. After switching to this operation, amount of steam discharged into the environment through valve is some 9.9 tonnes/hour.

▲ *Engineers check waste at the Factory*

▲ *A lake inside the Dung Quất Oil Refinery*

At the lowest level, every year for three months of operation, two boilers operated by steam turbine and one boiler operated with electric motor, have helped limit 21,384 tonnes of steam discharged into the environment. The low-pressure steam costs 50.03 USD/tonne, saving some 1 million USD/year (excluding the electricity bill). This Project has been applied since January 7th, 2014.

Looking back at what the BSR has done in recent years, we can see the tireless efforts on the part of the factory's employees to protect the environment. We cannot buy a clean environment with money. Despite high costs, decreased profit, long-term capital recovery and several other disadvantages, a clean environment is priceless.

Early June 2016, BSR did its utmost to carry out environmental protection activities on the occasion of the annual World Environment Day (June 5), with the slogan "nature's call and our actions". We can see how BSR's leaders and its staff are joining hands ensuring a clean environment■

SICK WATER

▲ *Nutrient pollution of recreational waters is ruining holidays and poses a serious health risk*

Summer time in the Northern hemisphere! Time to go to the beach or a nearby lake to enjoy the water in the hot weather. Swimming, water-skiing, rafting, snorkeling, playing "fetch" with your dog - pleasurable ways to unwind.

But danger lurks. You throw a stick into the lake. Your dog bounds after it and later dies. You inadvertently swallow water while swimming and get parasites. You eat seafood in a restaurant near the coast - and get sick. You head off for a swim in a lake only to find that is covered in green slime.

This is no horror movie. It's a real-world problem, happening right now: Health warnings about dangerously polluted "fresh" or coastal waters are increasingly frequent. Pollution, mainly in the form of fertilizer run-off, livestock waste, and domestic and industrial wastewater discharges are the chief culprits.

A trawl of the Internet reveals a host of frightening reports about all the dangers and restrictions - things that were pretty much unheard of 50 years ago when our ecosystems were much more robust than they are today.

"Cyanobacteria (blue-green algae) now threaten the ecological well-being of some of the world's largest water bodies, including Lake Victoria in Africa, Lake Erie in the United States and Canada, Lake Taihu in China, the Baltic Sea in Northern Europe, and the Caspian Sea in West Asia. They've also been found in Lake Kokotel in Eastern Siberia, which is next to Lake Baikal, the world's largest, deepest and most ancient freshwater lake." (Article in Scientific American 2013)

USA, 2016 - "It's as thick as guacamole, but you don't want it near your chips. You don't want it in your water, either, but that's exactly where it is, a sprawling mat of toxic algae the size of Miami, spreading out across Florida's storied Okeechobee lake and from there along major rivers to the state's Atlantic and Gulf Coasts. Fish are dying. Beaches are closing. People are getting sick. Governor Rick Scott has declared a state of emergency in affected areas…".

USA, 2015 - "Sonoma County public health officials are weighing the extraordinary step of urging people and their pets to avoid the Russian River after a dog that died moments after swimming in the water preliminarily tested positive for a lethal toxin produced by blue-green algae…".

China, 2015 - "Every summer, the Yellow Sea turns green as a thick carpet of algae covers the beaches of Shangdong province, Eastern China. People living in Qingdao and nearby coastal towns have grown accustomed to their beaches looking more like verdant meadows every July… Partly as a result of the algae, Qingdao's beaches are home to a bizarre fashion trend: the Facekini. Many local women sunbathe and swim wearing masks to prevent sunburn and stop the algae getting tangled in their hair".

Australia, 2016 - "For much of this year, up to 1,700 km of the Murray river has been hit by a serious outbreak of potentially toxic blue-green algae, which has flourished in the hotter-than-average conditions… The past decade has seen four similar blooms on the Murray river: in 2007, 2009, 2010 and now".

Chile, 2016 - "An algal bloom in Chile that has killed up to 20 percent of the country's farmed salmon, causing higher prices globally, has started to recede along with fish deaths, the government said on Friday. Chile is the world's second largest producer of salmon and trout after Norway".

The apparent increase in the occurrence and frequency of harmful algal blooms (HABs) in freshwater and

coastal aquatic ecosystems across the globe is being linked to the influence of ever-expanding human developments and the associated pollutant discharges where little is being done to adequately treat or divert nitrogen and phosphorus (two key nutrients often concentrated in these discharges) which are what nourishes algae in the water and causes algal blooms. The other worrying factor compounding the problem is climate change. With warming oceans, lakes and other aquatic ecosystems, as a result of warmer atmospheric temperatures, conditions become even more conducive for HABs to flourish in nutrient-enriched environments.

WHAT CAN BE DONE?

Governments could start by putting in place thresholds and standards for acceptable water quality in fresh and coastal water bodies. This in turn must be linked to the quality of farm (including livestock) runoff and waste discharges that are released from wastewater treatment plants and discharges from industrial sources. Best practices to encourage nutrient use efficiency (e.g. fertilizer application in crop production) and reduce harmful nutrient pollution discharges need to be implemented in agricultural and wastewater treatment systems.

The International Water Quality Guidelines for Ecosystems (IWQGES), published on 15th March 2016 as a draft for regional consultation, provides a framework and contains the most relevant information required to develop water quality guidelines for ecosystems, including approaches to identify indicators and set target and threshold values.

IWQGES is advisory. It is aimed at governments, but also sub-national and regional authorities. Guidelines cannot be developed and implemented without the involvement of regional authorities, water resources management authorities, stakeholders and technical and scientific services.

In September 2015, the United Nations General Assembly adopted the 17 Sustainable Development Goals (SDGs) with their inherent 169 targets, thus defining international aspirations, but also to a large extent the trajectory towards sustainability and development. The dedicated water goal (SDG 6): "Ensure availability and sustainable management of water and sanitation for all" with its eight targets, explicitly addresses the improvement of water quality and the health of freshwater ecosystems. In addition, SDG 14 "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" targets prevention and reduction of marine pollution particularly from land-based activities, including nutrient pollution.

The tools and best practices for managing water bodies are available. Now, Governments, regional and local authorities need to take action to ensure your well-being. The cost of inaction will be greater than the cost of action.

BACKGROUND FACTS

Eutrophication

Excess nutrient flows of phosphorus and nitrogen from farms and sewage into the aquatic system lead to algal blooms. Too much nitrogen and phosphorus in the water causes algae to grow faster than ecosystems can handle. As the algae dies, the oxygen in the water column is consumed. In extreme cases it can become completely deoxygenated, creating what is known as "hypoxic" conditions; such areas are termed "dead zones" Some algal blooms are harmful to humans because they produce elevated toxins and bacterial growth that can make people sick if they come into contact with polluted water, consume tainted fish or shellfish, or drink contaminated water. The primary sources of nutrient pollution are agriculture, storm water, domestic and industrial wastewater, soaps and detergents.

Toxicity

During a bloom, algae can produce nocive toxins that can render water unsafe and cause fish mortality, or can impact human health through the consumption of contaminated seafood, skin contact and swallow-water during recreational activities. Diatoms and dinoflagellates are involved in the production of toxins responsible for poisoning in humans. Toxins are usually released when an algal bloom dies off. Water or seafood contaminated with toxins are odourless and tasteless, and toxins cannot be destroyed by cooking or freezing.

Species

Diatoms are unicellular, photosynthetic eukaryotes and include about 100 species in marine and freshwater. Marine diatoms play a central role in the aquatic environment, contributing to 40% of primary productivity in marine ecosystems and 20% of global carbon fixation.

Dinoflagellates are microalgae which form a significant part of primary planktonic production in waterbodies and are largely responsible for HABs.

Cyanobacteria or "blue-green algae" comprise a diverse group of oxygenic photosynthetic bacteria with the ability to synthesize chlorophyll-a (a specific form of chlorophyll used in oxygenic photosynthesis) and other accessory pigments like phycobilin, phycocyanin and phycoerytrin proteins.

ĐỖ HOÀNG

(Source: Facts from EU 2016 - Algal bloom and its economic impact)

Wild tigers claw their way back from extinction

New study shows a 58 percent increase in tiger populations in one country.

Can India's wild tiger population claw its way back from extinction? According to the latest research that answer is yes.

The tiger (Panthera tigris) is one of the largest cat species in the world. Males can weigh up 850 pounds in the wild. Massive as they are, these majestic creatures require large contiguous areas of habitat where they can hunt their prey typically ungulates such as deer and water buffalo.

Because they are indigenous to some of the most densely populated places on Earth, this large space requirement has resulted in a number of environmental conflicts with humans. This, combined with the heavy demand for tiger skins and body parts in some areas of the world has led to decimated tiger populations worldwide.

At one time, tigers were abundant, ranging from Turkey in the East to the Eastern coast of Russia to the West. Their numbers were estimated at 100,000 at the turn of the 20th Century. Over the course of the last one hundred years, tigers became extinct in western Asia and their populations became fragmented in the remaining parts of their range.

Today, wild tigers are threatened throughout the world. They are listed as "endangered" on the IUCN's Red List of Threatened Species, with numbers ranging from 3,000 - 4,000 animals. But the latest population data out of India are promising, and the rest of the world is taking a closer look to see if this iconic animal can in fact make a comeback.

▲ *Sumatran Tiger*

The National Tiger Conservation Authority (NTCA) recently surveyed the population of tigers in India using 9,735 cameras that monitored 146,000 square-miles of forests. Researchers gathered photos of 80 percent of India's tigers, identifiying them by their stripe patterns - an indicator as unique to each individual tiger as fingerprints are to humans.

The results were promising. The tiger population in India grew from 1,706 in 2011 to 2,226 in 2014. That works out to a 30 percent increase. When you compare the latest numbers to population data from 2006 when there were 1,411 tigers in India, it equals a 58 percent increase in population!

What's more, with more than 70 percent of the world's tigers living in India, this impressive population rebound signals good news for the tiger population as a whole world-wide.

"Our latest estimate today is that India has 70% of the world's tiger population and we have now 2,226 tigers presently in 47 tiger reserves (up from 1,706 in 2011) and this is a great achievement. It is a net increase of 30% over the last estimation, "Environment Minister Prakash Javadekar said in a recent statement.

While India's numbers are worth celebrating, conservations caution that the battle is not yet won. Within other tiger range countries - China, Laos, Cambodia, Việt Nam, Thailand - there is still huge demand for tiger skins and bones, making poaching and illegal tiger trade a constant battle.

Debbie Banks, a lead tiger conservationist working for the Environmental Investigation Agency - a U.K based conservation group said: "Tigers are major indicator of the health of the environment, certainly the health of the forest that they inhabit. But they are the water gods, if you like. They are indicators of how well we are doing to conserve forests that provide water for millions of people and mitigate climate change".

HOÀNG DƯƠNG

(UNEP source)

GREENDY HYDROPONICS:
Grow pesticide-free vegetables at home

▲ *Students won the third prize at Đà Nẵng Start-up Runway 2016.*

You don't have to worry about how pesticides in vegetables are damaging your health anymore. To meet the demand for growing fresh vegetables in large cities, a group of students at the University of Economics in Đà Nẵng city have come up with a model called Greendy Smart Hydroponic Vegetable Production, which gives effective economic results while protecting your health and the environment.

The innovative concept has won the students third prize for "Đà Nẵng Start-up Runway 2016".

Greendy is a model for growing vegetables at homes using the hydroponic method and has two main components: The hydroponic platforms, and the Greendy application runs on smartphones.

The hydroponic rig is made of PVC material and stainless steel and is designed as per the customer's requirement. To operate the pump system and sensor-related factors such as pH, temperature, water volume and water levels, customers have to install wireless modules that are linked to their smartphones.

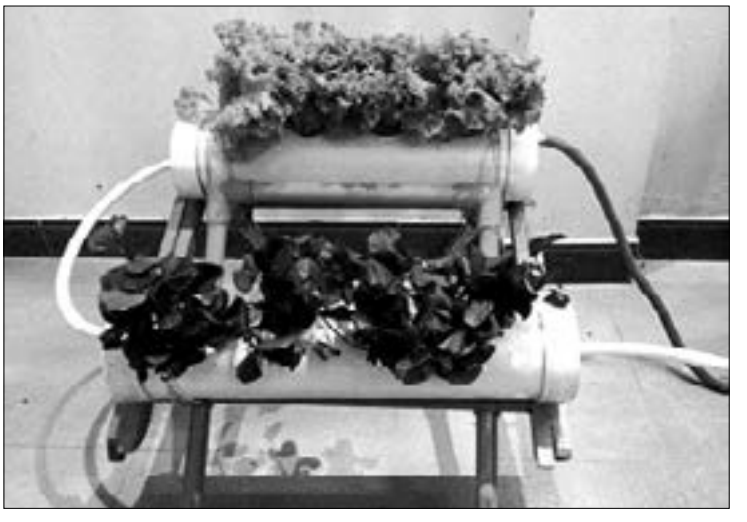
Hydroponics is a method of growing vegetables and fruits without soil, using mineral nutrient solutions - with sodium, phosphorus, potassium, nitrogen, calcium, magnesium, zinc and iron - in water. The roots are surrounded by a sterilizing mixture such as coconut fibre, rice husk and lava, The method is suitable for narrow spaces such as terraces, and balconies in urban areas. It ensures that plants do not have chemical residues.

Once customers sow seeds and start up the Greendy application, the wireless, electronic circuit will receive signals and control the hydroponic solution through a preprogrammed formula. The sensor is installed in a solution tank and will automatically measure pH levels by adjusting the volume of water to be pumped into the tank. A diluted hydroponic solution will be pumped into the pipe system automatically after 24 hours.

An automated system, all users have to do once they get the hydroponic truss home is set up the Greendy application and take the three steps as follows: sow seeds, open the application on their smartphone and choose vegetables and wait for 20 days before picking them. People don't need to spend much time tending to their vegetables.

Besides, giving you pesticide-free vegetables, the Greendy model will add greenery to your homes and help decorate your interiors.

Vegetable growers can interact with the system using their smartphone. The Greendy application will send notifications to growers when there are unusual problems, like for instance, if it runs out of water or solution. The application also lets people control the system remotely, through Wifi, Bluetooth and messages.



▲ *A model of smart hydroponic plantation*

The most important feature of the application is that customers can get all data on the optimal formulation for each kind of crop in it. Growers only need choose the vegetables they want, the Greendy application will identify which solution to make for which vegetable automatically.

During the growing process, all information regarding temperature and pH level of the hydroponic solution will be sent continuously to the app so that growers can monitor what's happening. Solution pumping is also automatically pre-programmed, but growers have the flexibility to set up the time to open and close the pump.

If that's not all, the application also instructs people on how to use the system and offers recipes, including special ones for dieters. It has nutritional information of all the vegetables and suggests weekly or monthly plans based on the biological characteristics of the user.

These features were built into the Greendy application as the Start-up Run way competition had a specific requirement - that all products entered must have a unique feature that is practical and has high application value in the real world. Over three months and many rounds later, the Greendy team's concept was completed and listed among the top 10 best ideas of the contest.

The Project was a huge challenge as most of the team's members are students of business administration who have no specialisation in technology. But after a lot of time and effort, the application was completed successfully.

The team hopes this application will become an educational model on protecting the environment by applying smart technology for global development. Team members also hope the application will help households grow their own vegetables and help change the perception of production methods, to create uncontaminated produce■

QUỲNH ANH

WORLD'S 2nd LARGEST DELACOUR'SLANGUR POPULATION FOUND IN NORTHERN OF VIỆT NAM

The world's second largest population of the endangered Delacour'slangur primate has recently been discovered by conservation NGO, Fauna and Flora International, giving fresh hope for one of the planet's rarest species.

"Our surveys and assessments revealed that there was a population of significant size. We detected seven groups of Delacour'slangur, with the total number of primates in the population as high as 40. Only one other area in Việt Nam has a larger population of Delacour'slangur," FFI Việt Nam's Biodiversity Technical Advisor Trịnh Đình Hoàng said in a statement.

The Delacour'slangur is indigenous to Việt Nam, yet because of human activities such as hunting, stone mining and charcoal production, it is currently under severe threat of extinction with fewer than 250 left. Although they remain under grave danger of being wiped out within a decade, scientists now have renewed hope that they can be saved.

Speaking from the Congress of the International Primatological Society in Chicago, Mr. Trịnh Đình Hoàng said: "We've notified the Vietnamese authorities of our findings and recommendations, and we continue to work alongside officials and local communities to ensure the Delacour'slangur doesn't become this century's first primate extinction".

Delacour'slangur *(Trachypithecusdelacouri)* is a primate endemic to Việt Nam, which was first discovered by Jean ThéodoreDelacour in 1930 and described by Wilfred Hudson Osgood in 1932. In the early 1990s, a comprehensive survey recorded 19 isolated sub-populations comprised of 50 - 57 groups and 281 - 317 individuals in an area of about 5,000 km in the North of Việt Nam. More recent surveys indicated that the species has experienced a significant decrease in both the number of populations and the number of individuals. In the last decade eight to nine sub-populations have been eradicated.

SƠN TÙNG

Traditional knowledge of Tày people in natural resource protection in Lạng Sơn

NGUYỄN THANH THỦY, CAO THỊ THANH NGA
Vietnam Academy of Social Sciences

There are seven ethnic communities living in Lạng Sơn province of which Tày people makes up 35.92%, and Nùng, Kinh, Dao, Hoa, Sán Chay and H'Mông. Making use of valley landscapes, Tày people have exploited the land area for paddy rice cultivation for many generations. However, to ensure food supply for the family, Tày people have changed the rice variety and improved the water irrigation system to increase crop intensification and expand the field. Particularly, Tày people also make use of water resources "bring water to the field" through the channel system. Therefore, Tày people have formed diverse traditional knowledge, particularly knowledge in land protection and water retention for agricultural production.

▲ *Meeting to select the group leader for protecting forests according to the village convention at Le village, Xuân Lễ commune (Lạng Sơn province)*

TRADITIONAL KNOWLEDGE OF TÀY PEOPLE IN PROTECTION OF LAND AND WATER RESOURCES

Land resource protection: Through many generations, Tày people have accumulated countless experience in protecting soil fertility for rice cultivation. For low lying fields, Tày people usually increase the humus for the field soil by ploughing before rice planting, then spreading manure in the field and evenly being harrowed by buffalos. Manure is made by bead tree leaves (xoan) and wild trees. In deep field foot, acid soil, Tày people implement top dressing by lime to reduce acidity. For terrace rice field, Tày people make the field bank of around 30 - 40 cm, covered by grass. The grass bank aims to protect the soil from landslides in heavy rain. For narrow fields, Tày people plant draught tolerant trees which also maintain the moisture of the soils such as cassava, maize and soy bean. For gardens, Tày people implements models that combine fruit trees, timber trees and industrial trees that bring high economic values.

In addition, Tày people apply slash and burn practice to convert forest land into fields, by burning bushes and dry leaves into ashes which provide nutrients for the soil. For slash and burn without causing forest fires, Tày people create a border line with the width of 2 - 3 m to prevent fires to get into the forest. For disease prevention, Tày people mix sliced bead tree leaves with ashes to spread in the fields, or spray the liquid of sour bamboo shoots mixed with betel on paddy rice when rice is affected with disease, without using chemical pesticides.

Water resource protection: According to Tày people's opinion, clean water source is very important; therefore, they use bamboo pipes to transmit water and to avoid pollution of the water source. For water used for daily domestic activities, which relates directly to human health, Tày people select substantial water flows from original sources, from the upstream, and to transmit to households.

For water use in agriculture production, Tày people make embankment, implement water retention to create water flows, and then dredge small channels along hill sides to transmit water into the field. In addition, water is transmitted to high fields through water wheels and the flows of springs are controlled to make the flows stronger.

Protection of environment and forest resources through village conventions: Through long connection with forest and mountains, Tày people have accumulated knowledge and experience in protection of forest resources and environment which are illustrated in village conventions. The village convention consists of two parts including responsibility of local people on environmental protection; penalty mechanism for non-compliance with environmental protection regulations.

▲ *Mrs. Hà Thị Lỵ (Bắc Lạng commune, Đình Lập district, Lạng Sơn province) owns many precious medicine recipes from local herbs*

Accordingly, the village convention clearly identifies the responsibility of local people in forest protection and exploitation such as: no cattle in the forest; no animal hunting, trapping, catching... in the forest; in dry season, individuals and households prepare the forest prevention line in hotspots which forest fires are prone to occur in natural forests and plantations; field cultivation in the forest and near the forest must follow the guidance, supervision, and monitoring of the village head, forest staff and forest rangers in the area; when the forest owner want to use the forest at its exploitation age, the forest owner must apply for exploitation permission and count the number of trees, area, and volumes of trees to be cut and submit to the authorized agency for permission. In terms of environmental protection, households participating in manufacturing, commercial and domestic activities do not dispose waste, refuses, and wastewater which cause environmental pollution, without prior treatment to public areas. Households in the village must have sanitary, clean, and close toilets. Wells, water tanks, bathrooms… are sanitary. Animal corpses must be landfilled and must not be thrown into water sources that cause environmental pollution.

Regarding the penalty mechanism, the village convention regulates compulsory penalties for violation behaviors "if individuals, households, and organizations violate forest protection and environmental protection regulations, they are subject to warnings and condemnation in community meetings and the violation is recorded to submit to the authorized agency for appropriate penalties. The first and slight negative impact violation will be subject to warning and condemnation in village meetings; second and subsequent violations, based on community consensus, will be subject to criticism in community meetings; and the title of "cultural family" (for households) will not be considered, a maximum of 40,000 VND must be contributed to the community fund or work days for village activities such as clearing village roads, cleaning village cultural house… must be contributed". In other words, the village convention regulates two penalties: Village regulations and legal documents.

PROPOSALS OF SOME SOLUTIONS

Traditional knowledge in natural resources management of Tày people has brought high efficiency in environmental protection. Nowadays, despite technical scientific development, concretization of channels to each village, the value of traditional knowledge of Tày people in land and water resources use and management still remains. This not only contributes significantly to daily activities of local people but also contribute remarkably to the legal enforcement in natural resources protection in mountainous provinces.

For farmers to improve their livelihoods and to participate in forest protection and environmental protection based on traditional knowledge, it is necessary to have solutions to support the development of local people, specifically: It is necessary to study and document knowledge on forest resources use and management in order to integrate adequate traditional knowledge in activities to achieve sustainable conservation targets; encourage and promote existing village management mechanism, develop village conventions and documentation; develop agro forestry models, protect and sustainably use non-timber forest products based on the application of traditional knowledge in combination with advanced and modern scientific knowledge; combine communication, education, and awareness raising for Tày people with wise use and exploitation and sustainable management of forest resources; restore and develop the traditional craft to create more incomes for local people from cultural traditional products…■

Na Hang - Tourism potential in Tuyên land area

▲ *Na Hang lake is considered as "terrestrial Hạ Long"*

As a highland district, Na Hang is famous for diverse natural landscape with magnificent scenery and diversity of unique culture of 12 ethnic minorities. As an ancient land, a place where each river flow, each spring, each forest, each mountain is linked with a separate legend, Na Hang becomes the biggest tourism potential of Tuyên Quang province.

Na Hang originates from Nà Hang, according to the Tày ethnic minority which means "final field", locating in rice fields mixed with limestone mountains, primitive forests, and particularly lakes on the mountain, creating charming scenery, as a fairy picture dominating the green landscape. Mentioning Na Hang, it is impossible not to mention Na Hang lake - one of the biggest freshwater lake in Northern of Việt Nam, considered as a terrestrial Hạ Long Bay, bearing a quiet beauty, a combination of mountains and rivers and clouds. The lake surface is smooth and green like a mirror reflecting the mountain; the lake bed is the connecting point of Gâm river and Nang river, surrounded by 99 mountain peaks. Of which, Pắc Tạ is the highest mountain peak, look like an elephant bowing beside the alcohol vase, which is high, solemn, visible and invisible. At the mountain foot is the ancient temple worshipping a wife of Trần Nhật Duật General (13th Century), which is a sacred place for Na Hang people to show respect and hope of a peaceful life.

Surrounding the Na Hang lake, there are many natural rock strata with spectacular shapes with famous water falls such as Khuổi Sung, Khuổi Nhi, Mơ… their flows create the water foam look like white cloudy hair, colouring the green landscape. Particularly is the trekking journey to discover the hidden beauty in primitive forests of the Tắt Kẻ - Bản Bung Nature Reserve (Na Hang Nature Reserve), located in 4 communes Khau Tinh, Côn Lôn, Sơn Phú, and Thanh Tương. With characteristics of high mountainous climate and substantial temperature fluctuation between summer and winter, this place is favourable for the development of flora species. According to the incomplete statistics of scientists, in Na Hang Nature Reserve, 68% area is the primitive tropical moist forest, of which 70% is the forest on the limestone mountain. The vegetation is diverse with about 1,357 vascular plants, including 74 rare and threatened species (making up 5.45%) of the total recorded species; 62 species listed in the Vietnam Red Book (accounting for 4.57%); 25 species in Decree No. 32/2006/ND-CP of the Government on managing rare, endangered and threatened flora and fauna (about 1. 84%) and 10 species according to IUCN criteria 2014 (accounting for 0.74%) with many species of high use values such as trai, nghiến (Excentrodendron tonkinense), lát hoa *(Chukrasia tabularis)*, đinh *(Dysoxylum cauliflorum)*, thông tre *(Podocarpus species)*, hoàng đàn giả *(Dacrydium elatum)*, bách xanh *(Calocedrus macrolepis)*… In addition, the Nature Reserve has a large volume of famous timber tree species in the vegetation system in Northern of Việt Nam which needs to be conserved such as lát *(Chukrasia tabularis)*, sâng *(Pometia pinnata)*, giẻ đỏ *(Lithocarpus ducampii)*, de xanh *(Lithocarpus pseudosun-*

daicus), gội nếp *(Aglaia spectabilis)*, nghiến *(Excentrodendron tonkinense)* of thousands of years old, with the diameter of 2 - 3m and many medicinal trees belonging to the families of cúc *(Asteracea)*, ngũ gia bì *(Araliaceae)*, bạc hà *(Lamiaceae)*, trúc đào *(Apocynaceae)*, ô rô *(Acanthaceae)*, đậu *(Fabaceae)*...

In terms of fauna, currently the Na Hang Nature Reserve has recorded 88 mammal species, belonging to 25 families, 8 orders, making up 20.4% of total species of the flora system in the region, of which 18 species in the Vietnam Red Book, 15 in the World Red Book; 294 bird species, in 15 orders, 46 families, accounting for 68.2%, of which 7 species in the Vietnam Red Book, 6 in the World Red Book; 30 reptiles, 18 amphibians, of which 9 reptiles and 1 amphibian are in the Vietnam Red Book, 3 reptiles in the World Red Book. In addition, according to the incomplete survey data, the Nature Reserve has 300 butterfly species, 40 bat species, many fish and aquatic species, of which cá rầm xanh *(Sinilabeo lemassoni)* and anh vũ *(Semilabeo notabilis)* are in the Vietnam Red Book. The natural landscapes and rare and threatened flora and fauna system of Na Hang have attracted the attention of scientists, field staffs and tourists for discovery and exploitation.

In order to maintain a magnificent and majestic Na Hang, in addition to nature beauty, the contribution of the Management Board of the Na Hang Ecological tourism site should be mentioned. The Tourism Management Board that was established in Decision No. 166/QD-UBND dated 9/5/2007 by the Tuyên Quang Provincial People's Committee, supports the Provincial People's Committee in planning and investing in tourism development; manages and organizes tourism transport and service activities, environmental protection, security and safety for tourists; collaborates with relevant sectors to develop tourism routes and takes responsibility for all activities of the Na Hang ecological tourism site.

Mr. Lê Thanh Sơn, Director of the Tourism Site Management Board informed that, by now, the tourism site has finalized the construction of the tourist information site in Pắc Ban waterfall, Na Hang town; implemented investment procedures to construct the transport roads in Phiêng Bung tourism zone, in Na Hang ecological tourism site; designed to construct the Nà Chao cave, Nang Khả commune (Na Hang) and Khuổi Nhi waterfall, Thượng Lâm commune (Lâm Bình)… in the upcoming time, the Management Board will continue to collaborate with district people's committee of Na Hang, Lâm Bình and Bắc Mê (Hà Giang province) to implement the detailed planning of the Song Long cave, Khuôn Ha commune (Lâm Bình); collaborate with Bắc Cạn Department of Culture, Sports and Tourism, Ba Bể district people's committee to survey the transport route from Bản Dạ - Sơn Phú commune (Na Hang) to Xuân Lạc commune, Chợ Đồn district (Bắc Cạn province), to connect the Na Hang ecological tourism site with Ba Bể National Park (Bắc Cạn), to maintain and promote cultural values and to create tourism products.

Potentials and strengths of natural landscapes, local people, and diverse and rich cultural traditions of ethnic minorities in the locality will be the foundation for the economic - cultural - social development, particularly the tourism economy, tourism models and tourism services linked with neighbouring provinces such as Bắc Mê district (Hà Giang), Ba Bể and Pắc Nặm districts (Bắc Cạn)… so Na Hang is not only a nature reserve site or a landscape species conservation site but also an attractive ecological tourism site for domestic and international tourists, contributing to the development of Tuyên Quang province■

GIA LINH

▲ *Na Hang Nature Reserve with a diverse ecosystem of rare and threatened fauna*

Typical biodiversity values of Du Già National Park - Đồng Văn Karst Plateau

TẠ KIỀU ANH
Biodiversity Conservation Agency
Vietnam Environment Administration

Du Già National Park (NP) - Đồng Văn Karst Plateau about 30 km Northeast of Hà Giang city, is located in the location of three communes Tùng Bá (Vị Xuyên district); Minh Sơn (Bắc Mê district) and Du Già (Yên Minh district). The Du Già NP was established according to Decision No. 1377/2015/QD-TTg, based on the merging of the Du Già Nature Reserve and Khâu Ca Golden Snub-nosed Monkey Species and Landscape Area. This is an area of high biodiversity with many rare flora and fauna species such as golden snub-nosed money white cheeked gibbon, serow, bách xanh (Calocedrus macrolepis), bách xanh núi đá (Calocedrus rupestris), nghiến (Burretiodendron hsienmu), and đinh (Polyscias fruticose)...

FOREST RESOURCES AND BIODIVERSITY

Du Già NP that has an area located in the Đồng Văn Karst Plateau Geo-park has an area of 14,068.0 ha, making up 93.7% of the natural area. According to the Việt Nam vegetation classification system, the Du Già NP has five main forest vegetation types: low mountain tropical moist evergreen close forest in mountains of less than 700m; medium high mountain tropical moist evergreen close forest distributed at latitude of more than 700m; limestone tropical moist evergreen close forest; secondary vegetation types including secondary forests that were rehabilitated after exploitation and farming; some supporting vegetation such as bamboo forests, plantations (pine, acacia) and shrubs, timber trees…

The flora system of the NP has 1,061 vascular plant species, belonging to 629 genus, 202 families and six phyla. In other words, out of seven vegetation phyla identified to be distributed in Việt Nam, the Du Già NP has six phyla, making up 85.71% of the phyla. The most diverse phylum is Magnoliophyta with 950 species (contributing 89.54%), followed by Polypodiophyta with 88 species (accounting for 8.29%), Pinophyta with 12 species (making up 1.13%), Lycopodiophyta with nine species (0.85%), the remaining belongs to Psilotales and Equisetophyta, each phylum has one species. In addition, the diversity is also shown in the number of identified families which is 202, making up 53.44% of the total families of the Việt Nam flora system, of which 29 families have high number of species (accounting for 56.08%) such as Orchidaceae with 65 species (6.13%); followed by Euphorbiaceae with 46 species (4.34%); Rubiaceae with 45 species (4.24%); Moraceae with 39 species (3.68%); Asteraceae with 33 species (3.11%); Lauraceae with 26 species (2.45%); Fabaceae and Verbenaceae with 25 species each (2.36%); Araceae with 22 species (2.07%); Rutaceae with 17 species (1.60%) and followed by the remaining 19 families.

▲ *Golden snub-nosed monkey in Du Già NP*

Terrestrial vertebrate fauna system in the NP, according to statistics, has 318 species belonging to 77 families, 24 orders. Of which mammals has 72 species in 22 families, eight orders; avian system has 162 species in 37 families, 12 orders; amphibians and reptiles have 84 species in 18 families, four orders. Of 318 fauna species, there are 35 rare species, particularly the golden snub-nosed monkey which is one of 25 primates that are being significantly prone to extinction in the world. They are categorised as "critically endangered - CR" in both Vietnam Red Book (2007) and the IUCN Red

Book (2015). Golden snub-nosed monkey is a narrow endemic species, it only distributes in some area in the Northeast of Việt Nam. Currently, the golden snub-nosed monkey population is only between 108 - 113, making up nearly 50% of the current total number of golden snub-nosed monkey in Việt Nam.

In addition, 13 reptiles and amphibians are classified as rare (accounting for 15% of identified species) including 12 national threatened species, listed in the Vietnam Red Book (2007); five species at VU - vulnerable (Chinese water dragon, gecko, radiated ratsnake, impressed tortoise, and softshell turtle), seven species at EN - endangered (Chinese ratsnake, banded krait, Chinese cobra, big headed turtle, tonkin Asian frog, giant spiny frog and Vietnamese mossy frog).

POTENTIAL FOR ECOTOURISM DEVELOPMENT

With cool climate and magnificent mountain landscape, there are potentials for tourism routes and spots and rest stops for tourists to view rare flora species, ancient trees, and wild fauna species in the NP. The NP has Ba Tiên mountain range with 25 small and large peaks and Đèo Gió area located in the provincial road No.176 located in Yên Minh district, has the potential for ecotourism and adventure tourism.

In addition to magnificent natural landscape and biodiversity, the Mông, Dao, Tày... people communities also maintain traditional cultural beauty such as: Cap sac festival, new rice praying festival, season praying festival, Gau Tao festival, dancing new year, fair, love market… In this area, tourists can see the colours of brocade costumes and the echo of gong and dances. Special traditional cultural values of these people are valuable non-material cultural values, which are humanity resources to be exploited for humanity ecological tourism development in the NP■

MANY ENDANGERED SPECIES FOUND IN PHONG ĐIỀN NATURE RESERVE

▲ *Chrotogale owstoni taken by camera trap*

Nine globally endangered species have been discovered at Phong Điền Nature Reserve (NR), the Central province of Thừa Thiên-Huế, through camera traps. The detected animals include "cầy vằn" *(owston's palm civet, or chrotogale owstoni)* and "cầy giông sọc" *(large-spotted civet, or viverra megaspila),* which are listed as endangered in the IUCN Red List of Threatened Species.

The large-spotted civet was recorded in the wild most recently by camera traps in Phong Điền NR last June 2106. It is believed to be possibly extinct in China and Việt Nam. Meanwhile, camera traps have only found Owston's palm civet in Phong Điền NR in 2016 and in Sao La Reserve, also in Thừa Thiên-Huế, in 2015.

Since 2011, scientists have been striving to spot "gà lôi lam mào trắng" *(edwards's pheasant, or Lophura edwardsi)* by camera traps in the Central provinces of Hà Tĩnh, Quảng Bình, Quảng Trị and Thừa Thiên-Huế. "Gà lôi lam mào trắng" is indigenous to Việt Nam and critically endangered as listed by IUCN.

They expect to discover this species and other rare animals in Phong Dien Nature Reserve. Founded in 2002, Phong Điền NR covers 41,433ha of land in Phong Điền and A Lưới districts. It is also the first place to record Saola (Pseudoryx nghetinhensis) and "mang lon" (giant muntjac, or Megamuntiacus vuquangensis) that have been found only in Việt Nam and Laos.

The NR harbours 44 mammal species, including 19 in the IUCN Red List and 16 in the Vietnam Red Book. It is also home to 34 reptile, 19 amphibian and 172 bird species.

QUỲNH NHƯ

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