INTERNATIONAL EXPERIENCES IN DEVELOPING ENVIRONMENTAL PERFORMANCE INDEX AND POSSIBLE APPLICATION IN VIETNAM

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Abstract:

Environmental sustainability has been identified as important content and orientation in socio-economic and environmental development policies in our country. Reviewing the implementation of sustainable development goals of these policies, as well as environmental policies will provide the basis for process of planning, revision and monitoring of the progress of implementation of policies by central, local agencies concerned. In the world, the method of assessment of environmental performance based on reliable collected data has been developed and tested at national level, the approach of this may be used to elaborate a method of evaluation at local level. This paper introduced international experiences in developing global Environmental Performance Indicators and the possibility of develop them in the context of Vietnam.

Keywords: EPI; Environmental Performance Index; Sustainable Development.

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1. Introduction

Globally, environmental sustainability has increasingly been received due attention in development policies of the country. Since the Rio Earth Summit, many countries have made every effort to assess and demonstrate their progress in the implementation of environmental policy, through quantitative measures applied in pollution control and natural resources management. Besides, governments are also facing a growing pressure of how to prove that their environmental protection efforts were effective.

Sustainable goals can only be achieved if there are development policies appropriate and the implementation of policies for environmental and natural resources management effective. However, the policy making process and the evaluation of such policy enforcement under a national, regional context or the comparison, in narrower context, between different regions or provinces in the country requires an effective scientific and evidence-based approach. To meeting this requirement, scientists have

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studied and developed a system of comprehensive indicators for assessment purposes.

In Vietnam, under the pressure of economic development on environment, the requirement of making appropriate policies, as well as their effective implementation is becoming increasingly urgent. However, if without basis to evaluate the effectiveness of already issued environmental policies in a consistent manner, then it will be very difficult to revise the existing applicable ones or develop the new policies suitable to reality. On the other hand, although there have been indexes of environmental quality assessment, monitoring programs and policy-making in our country still face with challenges such as incomplete, synchronized, conflicting, low reliability environmental data. So the approach to follow the methods developed and being used globally for effective evaluation would be an appropriate approach for Vietnam. There should be a standard database, a set of quantitative indicators for analysis and evaluation of environmental policies to assist the process of policy-making and policy enforcement be more effective.

The Environmental Performance Index (EPI) of Yale and Columbia University is an example for environmental assessment at global level, however, the possibility of application in local context like in Vietnam still exposes many issues to consider and address. This article introduces a new approach in environmental performance assessment in the world, through the example of EPI, and analyzes some difficult, favorable conditions when applying in Vietnam.

2. Approach DPSIR in environmental performance evaluation

DPSIR is an approach to analyze comprehensive socio-economic and environmental aspects to assess the sustainability, developed in 1993 by the Organization for Economic Cooperation and Development (OECD), and then applied by the European Environment Agency (EEA) since 1995. DPSIR is the abbreviation in English words: Driving - Pressure - State - Impacts - Response. Each specific word expresses different meaning to describe the relationship between human socio-economic development activities and the environment. ***Driving (D):*** is the social, demographic and economic development in society and corresponding changes in lifestyle, consumption and production patterns. More specifically, driving is often meant as socio-economic branches to satisfy the human needs such as food, water, housing, health, security, culture. Driving puts pressure on the environment as a result of production and consumption processes. ***Pressure (P)***: is meant the pressure (intentionally or unintentionally) from human activities on the environment. Pressure includes: the use of natural

resources, changes in land use, emissions of substances (chemicals, rubbish, noise, radiation,…). Pressure makes influence on changed environmental status. **State (S)***: it describes the quality of environmental elements (air, water, soil,...) in relation to the function of each element. Therefore, the environmental status reflects geographic, chemical and biological conditions of environment. **Impacts (I)***: is the effect due to changes in the environmental status on human life through services (functional or potential) of the life-support ecosystem. **Response (R)***: is meant the human decision to remedy the impact on ecosystems or their values.

According to DPSIR approach, the development dynamics of the economy create pressure on natural resources consumption and cause environmental pollution. If this pressure exceeds the capacity of that territory, it shall be considered as unsustainable and the direct result will be the degradation in environmental quality. In order to make effective development policies, there should be a system of indexes to support DPSIR model, these indexes can be verified through its various components to establish a cause - effect relationship of environmental ecological degradation. Approach by DPSIR socio-economic development indicators are integrated with environmental indicators under Driving and Impacts issues.

DPSIR has been applied in many countries as a new approach in analyzing environmental policy towards sustainable development goals. DPSIR effectively assists in assessing the success of the national targets on environment; evaluating the impact of them when implementing development policy and assessing the capacity for mitigating negative impact of development activities by developing appropriate policies and management methods. In Vietnam, the environmental statistical indicators are developed by General Statistics Office following DPSIR approach to help management agencies, policy makers easily assess the relationship between development policies and related environmental impacts, or identify which group of factors have made efforts to improve the environment, etc...

The set of Environmental Sustainability Index (ESI) was initiated and developed in 2000 by the Yale Center for Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN) at Columbia University. ESI was a precursor of the environmental performance index (EPI) which was also developed later on by Yale and Columbia. ESI was launched as a complement to the Millennium Development Goals (MDGs) and was a comparator argument for General Domestic Product (GDP) index, which has long been used to refer to the level of prosperity. The objective of ESI is to provide science

based quantitative data to review and evaluate long-term sustainable development goals. Although the Millennium Declaration set out the goals of sustainable development, it practically had no quantitative verifiable data to support the implementation of these goals, unlike for other goals such as poverty reduction, health care and education. ESI was published in the same year to help solve the problem of lacking related quantitative data to support the Millennium Development Goals and has helped governments to integrate the sustainability into objectives of key policies.

ESI was the first attempt to rank countries according to 76 different criteria on environmental sustainability, including natural resources, past and present pollution level, environment management efforts, contribution to the protection of the global community, and the ability of society to improve environmental performance along the time. However, because of broad research scope covering so many ideas, ESI looks like a guide for policy makers.

The use of environmental sustainability index (ESI) was not continued for a number of reasons. First, it was still difficult to obtain the same understanding, acceptance and measurement on environmental sustainability. Moreover, it remained limited for policy-makers to immediately use of ESI due to the complexity of issues of study, assessment, uncertainty of the scientific hypotheses on between cause - effect relationship, the complexity and competitive relationship between policy implementation actions with the socio-economic and environmental aspects of sustainable development. To evaluate the environmental effectiveness it needs a simpler approach, easier to measure for monitoring environmental impacts.

To address this challenge, in 2006, the research team of Yale University and Columbia University in the US shifted to do research on environmental performance index (EPI), focusing on narrower environmental issues that each government is responsible for implementation.

3. Environmental performance index (EPI)

After the UN Millennium Development Goals (MDGs) was launched to promote the countries worldwide implement development policies towards sustainable development, the formulation of standards for evaluation of the result of pollution control and natural resource management became a very urgent issue. MDGs set specific targets on reducing poverty, improving health conditions and education and commitments to environmental sustainability. However, there were many arguments that the environmental sustainability aspect of the MDGs was fully defined with appropriate

measurement. In 2006, Yale and Columbia universities of America studied and proposed the development of the environmental performance index (EPI) to address this deficiency. EPI focuses on two objectives of environment protection, namely: (1) environmental health and (2) enhanced health of ecosystems and better natural resources management. These two EPI objectives were toughly analyzed by scientists of Yale and Columbia universities based on environmental priority issues reflected in the relevant policies and largely in environmental issues mentioned in UN MDGs.

EPI was developed on the basis of inheriting the results of ESI, it was an attempt to elaborate further the concept of "sustainability" that had been still abstract in ESI. EPI was also developed to assess current environmental activities in countries around the world, within the scope of sustainability.

EPI includes many component indexes and divided into two major subjects. The first group, called Environmental Health index group, is to measure the effort to reduce pressure on the environment in respect of human health,. The second group, called Ecosystem Health index, is to measure the reduction of losses or degradation in ecosystems and natural resources. The indicators were selected on the basis of consideration and thorough review of environment policy researches, policy consensus through dialogue on Millennium Development Goals, and from consultation with specialists. These indicators can also express a range of priority quantitative and measurable environmental issues based on existing data sources.

EPI is periodically reviewed and updated to compare the implementation of national environmental policies and make assessment the environmental quality status of countries. Proposed in 2006, EPI first consisted of 16 indicators. EPI report 2010 included 25 indicators monitoring over 10 policy categories, they were used to compare and rank the national environmental protection effort of 163 countries. From the first trial in 2006, now there has been EPI implemented in 2008, 2010, 2012 and 2014, respectively. Since 2012, EPI has been developed to assess, based on time series data, the trend of EPI improvement over the years.

Yale University used objective approach by linking the policy objective indicators to calculate EPI. For each country and each indicator, a value close to the objective is determined based on the distance between the current results of a nation and policy objectives. The policy objectives are drawn from four sources: (1) international treaties or objectives highlighted in international agreements; (2) standards set by international organizations; (3) top priorities required by the country; (4) based on scientific consensus. Scores are calculated for each of the ten policy, based on 1-4 basic indicators. Each basic indicator represents a discrete set of data. This score

is then calculated separately for the Health and Ecosystem targets. Environmental Performance Index is determined by the average value of the two above total points (current weight per points is 30/70 equivalent to two groups Health and Ecosystem)[2].

The EPI calculation includes four key steps, as follows[3]:

Step 1 - Handling raw data: there may be missing data or differences in unit of calculation of the data collected from various sources, therefore it requires a processing step to convert them to the same level. While determining global EPI, Yale university was very careful to record the missing data and the cause of missing (due to specific characteristics and conditions of each country). Also in this step, the value of raw data (i.e, the total waste) needed to convert by dividing it per the population, GDP or some other form of data which can be compared across countries. Conversion unit was usually % (i.e, deforestation rate in a period of time), unit per each economic product (i.e, energy use per GDP), unit per area (i.e, percentage of territory exceeding a certain threshold of water extraction), unit per capita (i.e, CO_2 emission per capita).

Step 2 - Conversion of data: in many cases, data compared on the same indicator between countries do not differ too much, or the gap compared to the objective was very small. At this step, the use of logarithmic conversion technique to make the gap clearer before comparison. Using logarithmic transformation will help to distinguish more clearly between best practice countries (in case these countries had best achieved the results close to the goals), furthermore it also clearly shows a significant difference between the top and the bottom countries in the rank.

Step 3 - Converting data into indexes: the converted and logarithmic data is then transformed into indexes. These data created a common unit of analysis, allowing comparison between indexes as well as aggregated into one indicator. Different indicators using different indexes/ calculations as point z of index ESI (ESI's z-score) indicates hectares of biological productivity land of ecological footprint and the use of USD of green GDP. EPI used a method approaching to the target, i.e, the implementation of each country of any index was to be measured based on the location of that country within the scope defined for the worst performing country (equivalent to 0 in the scale of 0-100) and the objective (equivalent to 100). The calculation of indexes was by formula:

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[2] Yale Center for Environmental Law and Policy, Center for International Earth Science Information Network. *EPI 2012 Environmental Performance Index and Pilot Trend Environmental Performance Index.*

[3] Yale Center for Environmental Law and Policy. (2013) *Measuring Progress A Practical Guide from the Developers of the Environmental Performance Index (EPI),*

### *(international gap - distance to the target) x 100 / international gap*

For example, scores of the index "hygiene access (i.e the percentage of population have accessed to appropriate sanitation)" is calculated as follows:

- The goal is 100% accessed sanitation

- The worst performing country could be 5% of the population have access to appropriate sanitation

- Other countries may be: 65%

- International gap: 100 - 5 = 95

- Distance to the target: 100 - 65 = 35

- For countries with access rate 65%, the score close to the target is: (95-35)*100/95 = 63,1

Step 4 - Identifying potential target for indexes: International goals (e.g the goals stated in environmental conventions or by international organizations like WHO), scientific standards or decisions made from expert consultation processes can be used. For EPI, the achievement or over achievement of the target is equivalent to score 100 in a scale of 0-100. The benchmark for the poor performance is usually set out by the worst performing countries for each specific index.

- Weighing and ranking: After the data is collected and standardized, the final step is weighting and ranking. In calculating aggregate indexes, weighting and ranking is particularly a sensitive and subjective matter. There often is no clear consensus among experts about the formulation of aggregate indexes, how to determine the methodology to deal with complex issues such as those appeared in EPI. These weights had been used in the indexes, policies and objectives in order to calculate EPI aggregate scores. In the first EPI report, weights were 50-50 for two Environmental Health and Ecosystem goals. However, this measure made EPI aggregate index be strongly influenced by the results of the implementation of environmental health goals. The results showed that there was more correlation between EPI aggregate point with environmental health goals rather than Ecosystem goals. In other words, countries perform well environmental health objectives it looks as higher EPI aggregate points regardless to score of Ecosystem goals. Therefore, in the later EPI report, specifically in EPI 2012, the Environmental health targets were adjusted down to 30% of the total points meanwhile the Ecosystem objectives accounted for 70%. According to Yale University, the change in the weight simply reflected a

statistical correction which was necessary for aggregate method to calculate more balanced EPI scores between the two objectives.

Source: http://epi.yale.edu/our-methods
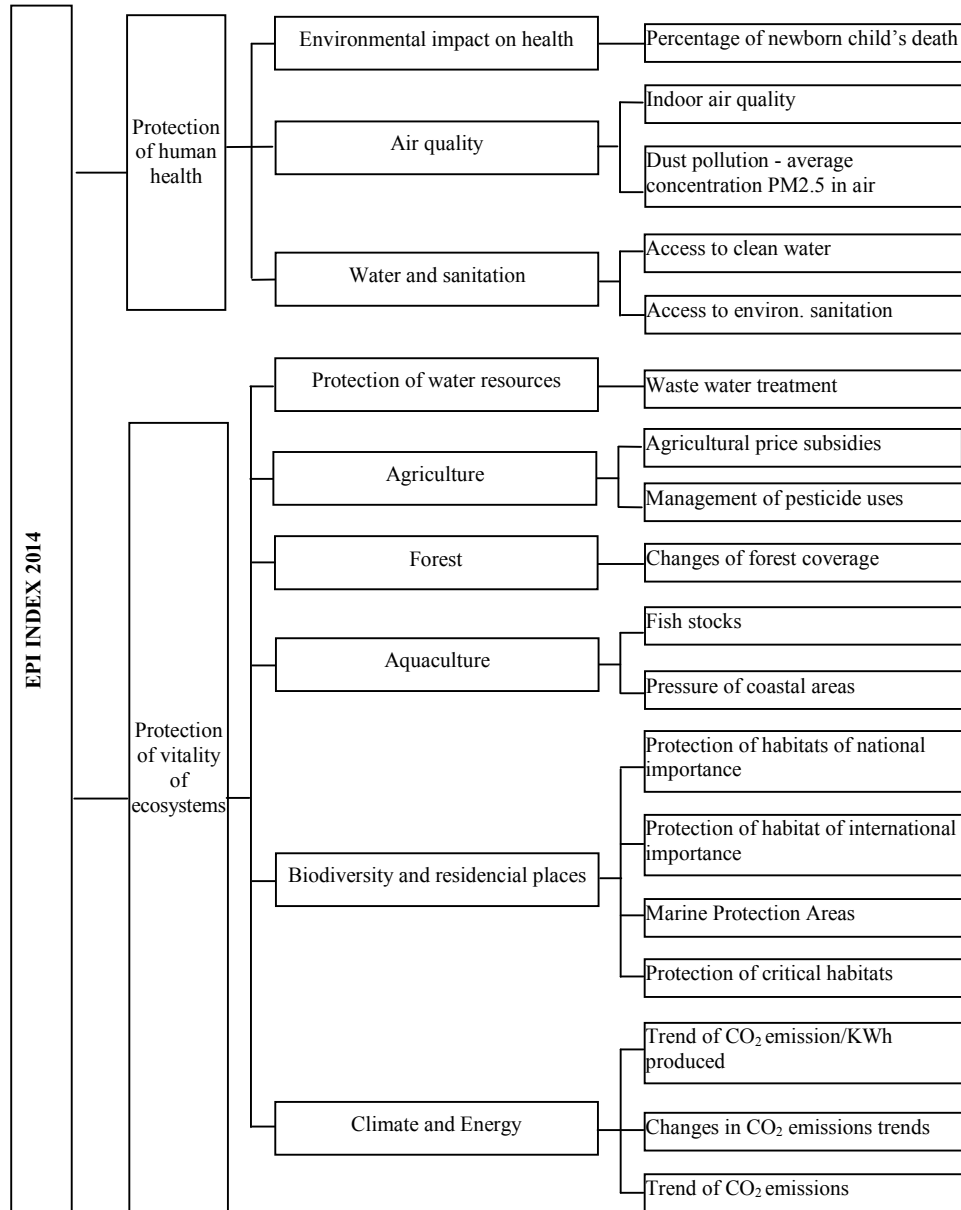
Figure 1. Yale Model of EPI 2014

The EPI model proposed by Yale and Columbia is represented in Figure 1. The two major objectives that EPI focused were the environmental health

and ecosystem vitality. For each subject, relevant policies had been reviewed using 18 specific goals. For example, with the goal of environmental health, health policy, impacts of water and air quality on human health were considered. Corresponding to these policies, group of indicators used were environmental impact caused by disease, accessibility to clean water or sanitation, urban dust, etc... The second goal the EPI wanted to show was the vitality of ecosystems. In order to accomplish this goal, the impact of policies on environmental quality on the ecosystem such as air, water pollution, biodiversity, forests, climate change etc. was considered. Correspondingly indicators were used to measure, for example, level of NOx emission, protected landscapes, growth of reserves, forest coverage, greenhouse gas emissions per capita, energy consumption, carbon emissions per unit of electricity generated, or carbon emissions per unit product produced by manufacturing industry, etc...

Through initial implementation of EPI, some advantages have been noted when ranking some countries, as follows:

(1) It could be used to determine the effectiveness of policies for environmental management, pollution control and identify the difficulties and challenges in quantitative evidence based management of natural resources. So the management or monitoring of environmental development trends was better thanks to actual data analysis, or clear comparison of success and failure factors of policies on environmental protection, it was a new approach to help policy makers develop and improve the policies be more appropriate with the practical requirements.

(2) EPI was used to evaluate the effectiveness of the implementation of environmental policies, serving as a basis for evaluating whether the set out policy objectives have been fully implemented or not.

(3) EPI helped analyze policies more closely. To implement this method, it should have systematic and unified reports, statistical data. Therefore, EPI required better databases established.

(4) Based on EPI index, the overall rating had important implications in indicating which country, region, locality that had done best implementation of environmental policy with environmental pressures that nation or locality were facing. Greater significance in terms of policy analysis that the use of in-depth analysis results based on the data to evaluate the effectiveness of policy implementation for specific issues; the type of policy effective to groups/organizations in society, at national or local level. Analytical results of such an assessment could be useful in adjusting policy options to help better understand

significant factors to environmental decision. More generally, EPI provided a powerful tool for every locality, nation to measure the environmental efficiency of their activities towards a sustainable environment.

EPI was developed by Yale and Columbia using a set of indicators to compare and rank environmental performance among countries. The basic premise of the EPI was that if only quantitative information and subjective judgment used it was not sufficient for environmental policy-making. Quantitative measurements are not only useful in policy making, but also help compare the implementation of feasible environmental policies. EPI monitors effective environmental trends based on analysis of the most reliable data from key policies. Additionally, through transparent and easy visualized data, EPI helps leaders understand the strengths and weaknesses of the environmental performance of the country compared with the others.

EPI reflects a screening by scientific method. DPSIR approach makes EPI becomes more useful for policy makers because they can focus their analysis on a narrower set of standards. These standards include core indicators meeting higher requirements, such as the results must be directly measured (rather than modeling of data), in a certain period of time, or within an institutional commitment to maintain these data in the near future. The strict application of standards thus allows tracking environmental performance by time and may continue in the future by using a set of more appropriate indicators.

At the provincial level, the application of EPI can help supplement the information in the process of preparing national reports. In the context of limited financial resources, this can help local governments be more convenient to assess the objectives of the policy, determine priorities and better implement environmental policy. However, it is difficult to interpret the unsatisfactory results. At the central level, EPI helps compare, identify which locality is leading or stays behind, EPI can determine results, clearly indicate which locality has implemented best environmental practices, and thereby can identify the priorities for appropriate actions.

Currently, some countries, such as China and Malaysia, have developed provincial EPI index following the approach of Yale University. In China, Yale University in cooperation with Chinese National Institute of Environmental Planning and City University of Hong Kong[4] from 2008 to 2010 to study and develop provincial EPI. This index aims to target three

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[4] Yale Center for Environmental Law and Policy, Center for International Earth Science Information Network. *Chinese Academic of Environmental Planning*, City University of Hong Kong, 2013. Toward a Chinese Environmental Performance Index

major subjects, namely environmental health, ecosystems, and economic sustainability, including 10 environmental policies with 32 environmental targets. Experience in development of Chinese provincial EPI shows difficulties and challenges in accessing data sources, particularly data on status of environmental monitoring. Some data on fisheries stocks and salty water quality had not met the requirement for calculating the general EPI. China's experience can be an important source of reference when developing provincial EPI in our country.

Another example is the case of Malaysia, the country also developed local level EPI, namely at 16 respective states. This EPI was developed by the Technical University of Malaysia in cooperation with the Ministry of Natural Resources and Environment of Malaysia. The process of Malaysia EPI development started around 2008 and by 2010 the first report published. Currently, through a lot of effort of continued improvement, Malaysia has announced EPI reports at local level for 2012, 2014. Unlike China, Malaysia EPI local level had additional goals of socio-economic sustainability (apart from the two goals of environmental health and ecosystem vitality based on a global EPI approach of Yale University), with 14 policies, 33 targets. Through yearly EPI reports, so far Malaysia has been able to compare the implementation progress of environmental policies of the state.

4. Development of local level environmental performance index in Vietnam

During past time, along with accelerated industrialization and modernization, Vietnam has made remarkable achievements in socio-economic development. The life of the people has been improved, the country has become a middle-income country. However, with the effect by global warming, our country also encountered with many pressing problems of pollution and environmental degradation caused by development process.

Bearing in mind of that, in the period 2005-2010, the Vietnam Government developed a relatively comprehensive, synchronized system of policies and laws on environmental protection, including Law on Environment Protection 2005, Biodiversity Law 2008 with a system of complete under-law guiding documents. The system of state management agencies on environmental protection from central to local level, from ministries to enterprises, has gradually been strengthened and in stable operation.

Since 1992, the Asian Development Bank (ADB) has launched a program for expanded countries in Mekong sub-region to support countries in the

Mekong River Basin to achieve the goals of sustainable development. ADB has proposed and implemented the content of Environment Performance Assessment (EPA) to strengthen national capacity in the preparation of environmental reports and determination of environmental index set. But the complete EPA type report had the main purpose to describe the picture of the current state of the environment without reflecting the quality and effective implementation of the policy on environment and natural resources management. There has not existed a system of indicators to compare localities regarding the effectiveness of implementation of policy in natural resources and environment management in a systematic and comprehensive way.

Approach to EPI calculation of Yale University following the method "Proximity-to-target" is a suitable direction. This method determines the results of implementation (can be quantified) of policies and compare with the already set out objectives. Then making general scoring to rank with the principle of the greater point the higher rank. EPI calculation is based on the principle of integration, i.e environmental performance results are determined by assessing a range of targets to measure the results of the implementation of a certain relevant policies. Because the implementation of policies and their impacts/ consequences created are very different, they should be converted to a coordinate comparable system. With the method of "proximity-to-target" calculation, different targets in policy group will be integrated into a general EPI targets to ensure the level of contribution of targets.

Proposed approach to develop provincial level EPI in Vietnam

EPI is a new approach in the world and currently is under pilot implementation to compare environmental performance at national level. Therefore, to formulate provincial EPI index, it needs to learn international experiences in the development of set of EPI proposed at the national scale (used to compare the effectiveness of environmental policies among countries) to inherit what can be deployed at the local level.

Through actual study, some difficulties and challenges in elaborating provincial EPI appropriate to conditions of our country are as follows:

- *Definition of priority objectives in environmental policies at the national and provincial level:* The consideration and review of the policy priorities in environmental management in Vietnam expressed specific objectives of each policy. Approach to calculate global EPI proposed and implemented by Yale University, defined the objectives of environmental policies as a basis to assess the extent of "completion" by

the country in respect of environmental commitments. However, with local level, there have many goals in environmental policies not been clearly stated, therefore in many cases, it may use national goals as a basis of comparison;

- *Lack of data on environment status and not synchronized data among localities:* Data is one factor playing a decisive role in the calculation of targets. Therefore, it needs to revise the statistical system of environmental targets which has been long developed and implemented. Based on this content, it is necessary to analyze the need, the possibility of developing suitable indicator set for Vietnam at the provincial level. Experience of Yale University using independent, verifiable and open access data sources. In local condition and capacity of Vietnam, the access to environmental data is more difficult, and there exists a incomplete database system on environment, so the identification of necessary and feasible data is extremely important for the success of EPI. In present conditions, the system of environment statistical indicators is being developed by GSO, when finished, it will be an important source of suitable data for EPI testing. However, it should not be limited to data sources from there, it can use data sources from local reporting systems and management agencies, or from independent studies in order to compare and verify;

- *Identifying appropriate environmental indicators to specific conditions and characteristics of localities*: in initial testing steps, the identification of environmental indicators according to the priority environmental issues will facilitate the development of provincial EPI. These indicators should reflect the environmental situation, and minimize the overlap when evaluating the issue using cause-effect approach. In reality, the separation of factors in cause-effect relationship is very difficult, so DPSIR approach is a suitable solution to determine target groups of driving, pressure, state, impact or response. There is not always available data on the status quo, so the selection of parameters under other remaining groups may be appropriate, for instance, response target group can reflect local efforts in implementation of environmental policies.

In the feasibility study stage, EPI at local level for Vietnam, approach by the EPI method of Yale University is appropriate, however, the group targets policy should be limited in environmental Health and ecosystem Health. This limitation is to evaluate the pilot experienced in the condition of existing environmental data (with the environment statistical indicators available in the national and local statistical system). Through the

evaluation of existing indicators, data and indicators accessibility it may suggest the composition of local EPI as follows:

- Group of indicators for environmental health assessment:

This group of indicators aims to assess the enforcement of environmental policies and their results via indicators of habitat quality. The most important environmental issues to be considered including: water, air quality, environmental sanitation, and waste management.

For water quality, the evaluation will consider the results of the implementation of the goal of improved accessibility to clean water of the people in urban and rural areas. Also, the accessibility to environmental services such as waste water treatment is also subject to evaluation. Group of evaluation criteria includes: *Indicator regarding proportion of urban population have access to clean water; Indicator of proportion of rural population using hygienic water; Indicator of urban waste water is treated in accordance with standards; Indicator of industrial waste water is treated in conformity with standard.*

Regarding air quality, the aim is to assess the possibility of reducing air pollution based on the results of air environmental monitoring, with the main parameters as NO2, CO and TSP. By assessing the current situation of data available at localities, the results showed that in provinces, some air quality monitoring stations have not covered all the area, only in major cities and some provinces. The evaluation indicators of air quality objective include: *Indicators for NO_2, CO, TSP*.

As concerned the assessment of policies to improve the quality and accessibility of the environmental sanitation services, it will be based on the indicators of the proportion of people using appropriate standard hygiene. The evaluation indicators for environmental sanitation: *Indicator of proportion of urban households having sanitary latrines; Indicator of proportion of rural households having hygienic latrines*.

Waste management is evaluated by indicators of collection and treatment of solid waste in urban and rural areas. Through reviewing the available data, primarily the figures from statistics of solid waste sources, the collection and treatment rates were not accurate as the data based on estimates by localities. The evaluation indicators of waste management is *Indicator of volume of urban solid waste collected; Indicator of number of solid waste treatment facilities in urban area conformant with standard; Indicator of rate of solid waste treated.*

- Group of indicators for ecosystem vitality assessment.

In this group, indicators to consider the relevance to activities of rehabilitation of degraded lands, conservation of biodiversity and forests, water resources. Due to the potential data have not yet met to carry out this evaluation, the selection of intermediate indicators can indirectly help reflect the local effort in reducing the impact of affected activities. Group of indicators to assess ecosystem vitality are, as follows:

+ Indicator to assess soil quality: *Indicator of pesticides used /ha of cultivated land; Indicator of fertilizer used /ha of cultivated land*;

+ Indicators to assess biodiversity conservation: *Indicator of percentage of biodiversity conservation area;*

+ Indicators to assess the objective of protecting forest quality: *Indicator of forest coverage; Indicator of primeval forest area;*

+ Indicators to assess the conservation of water resources: *Indicator of surface water quality.*

The above recommended indicators for provincial EPI to be initially developed, provided that there is condition and accessibility to the data at the national and local level. Based on the assessment on pilot exercise, the selection criteria will continue to be improved to better suit the actual local requirement in respect of management and implementation of environmental policies. The development of environmental performance indicators will serve as a basis for boosting efforts to implement environmental policies in localities. At the same time it would be an opportunity to build up a database system on environment, enabling policy-makers, academic, management agencies to get access, monitor and evaluate the environmental implementation at local and national level./.

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