

### **3. MAJOR OUTPUTS IN FY2008**

This project produced the following major outputs in FY2008:

- Conceptual design of SDPA,
- Three thematic studies to develop TMs of priority issues, and
- Country review papers that provide background of a Sustainable Development Outlook.

#### **3.1 Conceptual Design of SDPA**

##### **3.1.1 Introduction**

SDPA is a prior policy impact assessment, similar to strategic environmental assessment (SEA), that aims to assess the impacts of policies from the view point of sustainable development. SDPA covers impacts of proposed policies on selected economic, environmental and poverty indicators. Policies to be assessed (SD policies) will include environmental policies, trade policies, energy policies and so on, as various categories of policies have significant impacts on sustainable development, even we narrowly focus on sustainable natural resources management and poverty reduction.

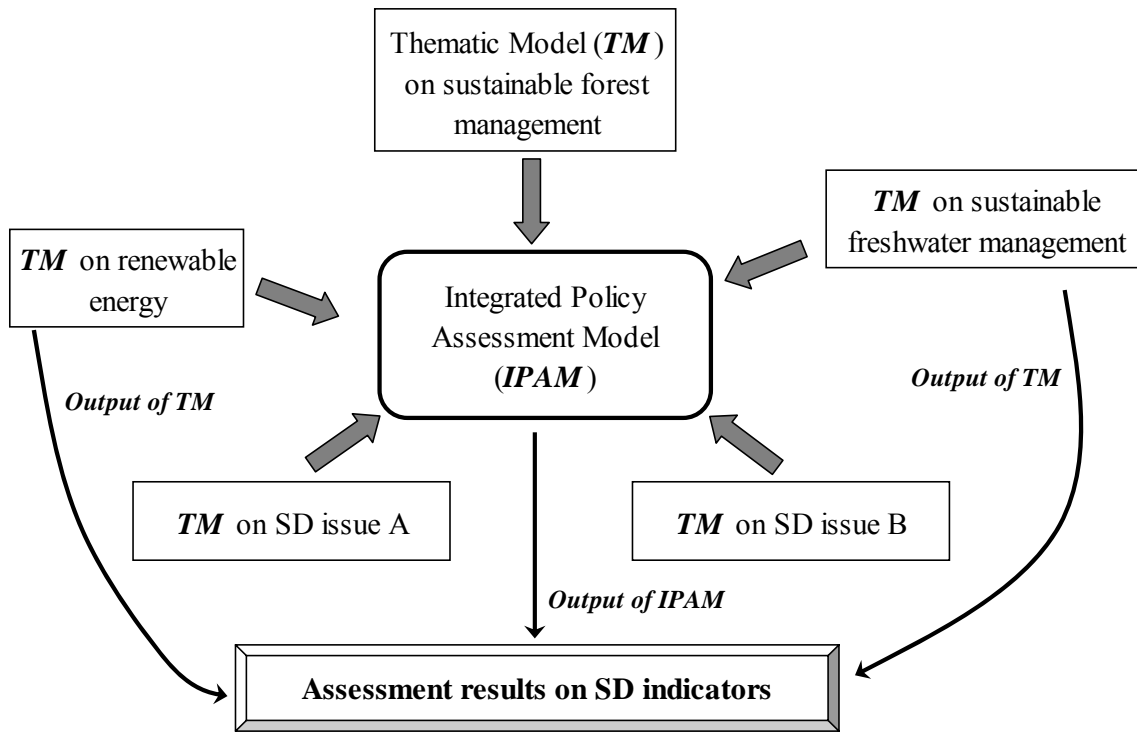
This research project will mainly address SD policies to be implemented at the national level (and local level if necessary), but it is still important to include regional aspect. Its rationales include, at least;

- Linkages between regional economic integration, another pillar of ERIA research, and SD policies are important, and SD policies also include trade policies,
- Some SD issues may have transboundary nature, and
- National SD policies could have “spill over” effects and regional cooperation will facilitate effective implementation of national SD policies.

To address these issues, a multi-regional computable general equilibrium (CGE) model is an appropriate analytical tool. Multi-regional CGE models are able to reflect the above regional issues in policy assessment at the national level. SDPA employs the Integrated Policy Assessment Model (IPAM) based on a multi-regional CGE as a core module of the analytical framework.

SDPA also employs other types of models to assess specific issues in more detail, as analysis on sustainable natural resources linking with poverty reduction, the focus of this research, often requires microeconomic models and/or spatial analysis models. Policy targets for the most environmental indicators are set as permissible levels of pollutant concentrations rather than nationwide pollutant emissions, and spatial distribution of emissions is important. Health is one of the key elements of poverty, and environmental targets are normally set to avoid negative health impacts. Another important element of poverty is lack of access to sufficient quality and quantity of natural resources, and policy impact assessment from such a perspective may require detailed micro-level analysis. For example, sustainable freshwater management may require watershed model using geographical information system (GIS). These models specific to some issues, which are

labeled as Thematic Models (TM), may mainly be national or sub-national (local), but it could be cross-boundary if the studied topic has transboundary nature. TM will provide assessment results directly or indirectly as input to IPAM, as shown in Figure 3.1.



**Figure 3.1 Image of linkages between IPAM and TSMs**

In addition to quantitative analysis, SDPA may also include qualitative analysis if necessary, but ways to provide quantified assessment results will be always sought as quantitative evidence is more appealing to policy makers.

SDPA is expected to exhibit the environmental, social and economic consequences of implementing proposed SD policy packages. The results will be either compared with authorised policy targets of selected SD indicators or expressed as the change from the existing situation.

The assessment will be mainly done at the national and the regional levels. IPAM will directly provide assessment results at the national level (and the regional level), while some TMs may focus on the local level impacts. The outputs of such TMs will be related to the national level assessment through generalisation of the results.

SD policy packages could include environmental policies, land use policies, agricultural or forest policies, trade policies, and so on. SDPA is primarily designed for national SD policies, but regional aspects can also be reflected. Concerning the regional economic integration (REI), another pillar of ERIA research, it can be incorporated as background scenarios to see how REI will affect policy impacts. Economic integration policies can also be assessed as one component of SD policies.

### 3.1.2 Development of Integrated Policy Assessment Model (IPAM)

#### (1) REPA model: a prototype model

IGES developed the Regional Environmental Policy Assessment (REPA) model as a main analytical tool to conduct impact assessment of environmental policies under regional economic integration in East Asia (Kojima 2008). The REPA model was developed based on GTAP-E model.<sup>1</sup> The main features of the current REPA model are as follows:

- The world is divided into 12 regions, i.e. Japan, China, Korea, 6 major ASEAN countries, the rest of ASEAN, the rest of OECD members, and the rest of the world. An economy is disaggregated into 33 sectors/commodities.
- Dynamics towards 2020 are incorporated by solving for a series of static equilibria connected by exogenous evolution of macroeconomic drivers. The employed time steps are 2001-2010, 2010-2015, and 2015-2020.
- Impacts of several environmental policies as well as import tariff reduction can be assessed simultaneously.
- The coverage of environmental impact assessment is GHG, air pollutants, water pollutants and solid wastes.
- Economic cost of environmental policies are reflected as decreased productivity of value-added (capital and labour) caused by diverting a fraction of value added from production process to abatement activities responding to the binding environmental standards.
- Poverty impact assessment module of the REPA model follows the method developed by the World Bank (2002), in which the averaged unskilled labour wage deflated by a food and clothes consumer price index (CPI) affects poverty headcounts (Anderson et al. 2006).

The current REPA model can assess the impacts of the following environmental policy instruments:

- Carbon tax
- Carbon emission trading
- Binding environmental standards for pollutant emissions and energy efficiency improvement
- Subsidies for abatement activities by firms
- International financial cooperation financed by revenues from carbon tax and emission trading

These features make the REPA model a suitable prototype of IPAM, but the following challenges need to be addressed to develop more elaborated IPAM.

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<sup>1</sup> GTAP-E is an energy-substitution-extended version of Global Trade Analysis Project (GTAP) model, which is a widely used multi-regional CGE model developed by an international consortium of researchers coordinated by the Center for Global Trade Analysis located at Purdue University, USA. For the details of the GTAP model, see Hertel (1996). Also see Burniaux and Truong (2002) for the details of the GTAP-E model.

- REPA model employs recursive dynamic approach that assumes steady-state equilibrium for each time step. This assumption is too strict to conduct simulations with huge exogenous shocks. It is highly desirable to develop IPAM with forward looking dynamic mechanism.
- REPA model inherits the shortcoming of the GTAP model that does not have separate government account (only “regional account” mixing up accounts of the government, households, and private sectors).
- REPA model does not reflect resource constraints and benefits from sustainable resource management are not well evaluated.
- Poverty assessment module is very preliminary, which estimates only poverty headcount (population below US\$2/day). It is important to reflect unemployment issues to improve poverty assessment module, as recent debate on Green New Deal clearly aims at job creation by green investment.

## (2) Forward-looking dynamics

Following Kojima (2007), it is planned to employ forward-looking dynamic specifications with imperfect foresight assumption for the development of IPAM.

Most forward-looking dynamic CGE models assume that households have perfect foresight in forming their expectations of time paths of price variables such as rental rates of capital, wage rates and exogenous prices. This apparently unrealistic assumption is helpful and justifiable to seek the first best outcomes. When the purpose of analysis is to formulate policy packages satisficing several constraints and policy targets under full of uncertainty, however, bounded rationality assumption seems an adequate approach taking into account the fact that any information is not enough for the households to perfectly predict entire time paths of exogenous prices. It is important to notice that the implication of bounded rationality is not confined in the way of information processing, such as selection of input information. Rather, awareness of bounded rationality would urge decision makers to tailor decision-making procedure itself to fit their cognitive ability. Replacing unbounded rationality with bounded rationality would introduce frequent monitoring-feedback process in the decision procedure.

In the employed forward-looking dynamic mechanisms, the households expect that the future trajectories of exogenous variables are constant at the current values but next moment they update this expectation based on realised values of exogenous variables.

## (3) Explicit treatment of government

It is planned to employ 2-stage optimisation model (Kojima 2007). This model is as follows.

Let  $V^P$  and  $V^G$  denote the objective functions and  $f^P$  and  $f^G$  denote the constraint sets of the private and the public sectors, respectively. Each sector maximises (or minimises, depending on model specification) its objective function by choosing the values of its instruments (control variables) subject to the given constraint sets. Let vectors  $\mathbf{x}^P$ ,  $\mathbf{x}^G$ ,  $\mathbf{y}^P$  and  $\mathbf{y}^G$  denote the control variables and the state variables of the private and the public sectors, respectively.

The private sector problem is

$$\text{Max}_{x^P} V^P(x^P, y^P; x^G, y^G) \text{ subject to } f^P(x^P, y^P; x^G, y^G) = \mathbf{0}.^2$$

The private optimal solution can be described as functions of exogenous variables, which are denoted as  $\hat{x}^P(x^G, y^G)$  and  $\hat{y}^P(x^G, y^G)$ .

Now the public sector problem can be expressed as

$$\text{Max}_{x^G} V^G(\hat{x}^P(x^G, y^G), \hat{y}^P(x^G, y^G), x^G, y^G) \text{ subject to}$$

$$f^G(\hat{x}^P(x^G, y^G), \hat{y}^P(x^G, y^G), x^G, y^G) = \mathbf{0}.$$

Note that the optimal solution of this public sector problem is in general the second best policy, which is *the* optimal policy from practical viewpoint.

The above explicit treatment of the government will facilitate assessment of government policies such as public infrastructure investment.

#### (4) Resource constraints

In order to assess policies promoting sustainable resource management, it is highly desirable to reflect major resource constraints such as land, water, forest, or mineral and energy resources to IPAM. There have been several attempts to incorporate resource endowment into global CGE models. For example, Berritella et al. (2007) incorporate water issues into GTAP model, and Lin (2004) compiled database for GTAP incorporated agro-ecological zones that are defined as areas with particular agro-ecological characteristics such as moisture and temperature regimes, soil type, or landform. Based on these achievements, it is planned to reflect resource constraints to IPAM as follows.

- Treat these resources as factor endowments
- Modify production functions of relevant sectors
- Raw water and treated water are different commodities. Raw water is production factor of agriculture, water utility and some water-intensive industries. Treated water is output of water utility and consumer good.

#### (5) Unemployment issues

Another big challenge for IPAM is reflection of unemployment issue, as CGE models basically assume full employment of factors including labour. To address this challenge, it is planned to employ the rural-urban migration mechanisms in which the urban unemployment rate and the rural wage rate are endogenously determine through equilibrating the expected utility levels between rural and urban areas, in the presence of downward rigidity of urban wage rate (Kojima 2007). In this mechanism, any factors differentiate utility levels between rural and urban areas can be modelled. Successful implementation of sustainable resource management for rural community is expected to increase rural income as well as quality of life including access to natural resources, and

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<sup>2</sup> The semicolon in the argument of functions separates the endogenous (left) and the exogenous variables (right).

will reduce rural-urban migration that leads to reduction in urban unemployment.

#### **(6) IPAM development roadmap in FY2009 and beyond**

The roadmap to develop IPAM is as follows:

- |                          |   |
|--------------------------|---|
| April –June 2009:        | Development of base regional model without resource constraints, unemployment issues. |
| July- September 2009:    | Reflection of resource constraints and unemployment issues into regional IPAM.        |
| April-October:           | Data collection.  |
| October – November 2009: | Calibration and validation of the model.  |
| December 2009- :         |   |
|                          | – Application of regional IPAM to assessment of SD policies for SDPA.                 |
|                          | – Development of country IPAM, if necessary.  |

### **3.2 Thematic Studies**

In FY 2008 the following three thematic studies were initiated. It must be noted that additional thematic studies are planned to be started in FY 2009 including institutional studies in a few case study countries. It is planned to invite proposals for additional studies in June 2009.

#### **3.2.1 Study on China's enforcement of water pollution prevention and control**

It is well recognised that poor policy implementation such as lack of enforcement has severely undermined the potential of relatively well designed policies in many Asian countries. This thematic study has two major objectives.

Firstly, it aims to quantitatively assess the impacts of effective implementation of environmental policies with a case of Chinese water pollution. Our basic hypothesis is that there is correlation between effectiveness of environmental policy implementation (or level of enforcement) and society's performance in both economic and environmental dimensions, and improvement in environmental policy implementation can generate not only environmental benefits but also economic benefits. We will test this hypothesis with econometric analysis using data representing effectiveness of policy implementation and society's economic and environmental performance.

Secondly, it aims to assess major factors, both negative and positive factors, influencing the effectiveness of China's enforcement of water pollution prevention and control, and analyse the contributions of environmental investment and environmental technologies and products to effective enforcement. In addition to the data to be used in the first objective, this component will utilise statistics and firm-level survey data of major factors influencing the effectiveness of policy implementation. Furthermore, interview and questionnaire survey on environmental investment and environmental technologies and products will be conducted.

It is a challenging task to quantitatively measure the effectiveness of policy implementation. Dasgupta et al. (2001) developed indices of status of environmental policies and environmental performance of 31 countries, using the data from UNCED environmental reports, which were prepared by all UN member governments as part of the preparations for the United Nations Conference on Environment and Development (UNCED, Rio de Janeiro, June 1992). This work quantitatively assessed the effectiveness of environmental policy implementation among other indicators. We refer to this study in developing quantitative indicators representing effectiveness of environmental policy implementation, and listed the following candidates:

- The coverage of policy
- The extent of machinery for enforcement of law and the coverage of policy
- Extensiveness of the legislation so far
- The progress of preparation of a national environmental action plan
- The availability of environmental data
- Roughly percentage of GDP is being devoted for environmental control measures

Candidates of environmental performance indicators include BOD, COD, SO<sub>x</sub>, NO<sub>x</sub> and CO<sub>2</sub>, considering the data availability in China.

The following indicators are candidates for economic impact assessment:

- Prevalence of environmental incidents/accidents
- Market share of pollution control industries in total industrial production
- The amount of damage cost from accidents
- The WTP towards environmental improvement in the former research The number of monitoring equipments and budgets for implementing monitoring
- The number of violation on law and regulations
- The amount of surcharge
- The number of a cease and desist order from administrative bodies
- The number of claim to local government and environmental law suits
- Budget and human resource for conducting environmental administration

The roadmap of this thematic study is as follows:

April-July 2009:	Data collection at the world level and its analysis
August 2009:	Research at the site in China
October 2009:	Analysis the data at the world level
November 2009:	Research at the site in China

January 2010:	Analysis the data at the national and firm level in China
February 2010:	Analysis on correlation between effectiveness of policy implementation” and “environmental and economic indicators.
April-July 2010-:	Follow up data collection in China.
August-October 2010-:	Analysis on correlation between effectiveness of policy implementation and major factors influencing the effectiveness of policy enforcement such as environmental investment and environmental technologies.
November-December 2010:	Formulate policy recommendations for effective policy implementation

### **3.2.2 Sustainable livelihood based watershed management – “Watershed Plus” approach**

Watershed development and management in rainfed agriculture areas can have important multipurpose benefits that arise from the role of water for livelihoods and health. Steady availability of water for agriculture increases the crop production and availability of biomass as crop residue for fuel and fodder which are the additional benefits for rural livelihood. Rural livelihood also depends on various non agricultural activities like dairy which can also be highly influenced by the development of integrated watershed development programs. Thus “Watershed Plus” is an advanced idea of ordinary watershed management which primarily includes better water management, minor irrigation, drinking water supply, providing sanitation facilities, forestry and intervention to address the specific needs for the poor in terms of micro crediting to use non timber forest products, aquaculture, orchard maintenance and handicrafts for income generation and livelihood.

Participatory approach based integrated watershed development or “watershed-plus” is an important tool to break the poverty vicious cycle in India provided the income generation potential for the marginal landless people achieves the optimal level which can compensate the annual opportunity cost of migration. Unless the project ensures the income of these marginal people more than their total expected annual migration remittance, it is hardly possible to convince them to stay in the village and help to develop and maintain the watershed projects. This has been identified as one of the major threats to the success of the participatory watershed projects also (Turton, 2000). Since, the watershed-plus project implementation mechanism is highly labor intensive, therefore, high migration rate adversely affects the successful implementation and maintenance of the project in a longer term. It is therefore, prerequisite for the policy makers to estimate the minimum income generation potential of the proposed watershed project to avoid any

future failure. In India there has been very limited study so far on estimating the optimal income generation requirement for each watershed project to prevent the migration problem. Up-stream and down-stream environmental pollution control including ecosystem are also neglected in the watershed models in India which are indirectly affecting the sustainability of the project as well as sustainable development of the beneficiaries. With this backdrop a study would be conducted on estimating the optimal income level that each watershed project should generate primarily to reduce or stop forced migration and secondly to provide the long term sustainability to the watershed project by improving the income level of the beneficiaries which will lead towards the sustainable development of the beneficiaries.

In order to frame a sustainable watershed modeling, a dynamic profit maximization function (by cost reduction of a water users' group cooperative that has cost free water distribution system) will be developed subject to the constraints of achieving minimum level of social and economic capital while maintaining ecological sustainability. We will consider a Cobb-Douglas type aggregative production function of the agricultural sector surrounding the watershed where the farmers already formed a cooperative to maximize their benefit (in the form of profit) from the watershed. Here we assume that human capital and water supply are the two main inputs for the steady income for the beneficiary cooperative. Human capital is the composite of labor and other physical capital of the beneficiaries including nutrition level and education while the control variable i.e. the human capital growth is linked to the condition of other social development issues like health facilities, market linkage through better road etc. In this model we introduced two main constraints. One is the minimum standard of the per capita income of the beneficiaries of the cooperative which is linked to the nearby urban area minimum wage rate and the second one is the minimum water level maintenance in the catchments to maintain certain ecological balance and also supply sufficient amount of water to cover the activities like horticulture, sanitation etc in addition to the farming.

As a result an optimal income generation path would be derived in terms of profit maximization of the WUG cooperative which would provide certain amount of guarantee to contribute towards sustainable development at least for a longer term through integrated watershed programs. Result would tell us how much optimal income has to be generated by the project which can protect local labor migration and can reduce corresponding social problems. Result would also tell us what is the marginal cost of improving the social well being of the WUG beneficiaries under the given constraints of environmental and ecological balances. Ecological constraint would be simplistically maintained at the level of maximum water use possible from the catchments area to maintain the year long availability of water and other necessary resources like fish. Finally a clear numeric target based indicator can be generated to evaluate the performance of the existing watersheds and to evaluate the future watershed project plans in India and abroad wherever it fits suitable. As a matter of fact, this research can directly provide the policy support to the NRAA (National Rain Fed Area Authority of India) activities under the following mandates:

- To guide the implementing agencies on priority setting and monitor the specific interventions required.

- To evaluate the effectiveness of completed watersheds and concurrent evaluation of on-going programs.

### **3.2.3 China's sustainable forest management: policy assessment based on spatial equilibrium model**

As important renewable resources, forests provide a wide range of timber and non-timber products. China has world fifth largest forestlands and sixth forest stock. However, at per capita level, China's forest resources are deficient with poor quality and unevenly distributed in the country. Rapid population growth and unprecedented economic development over the last two decades have led to a dramatic increase in wood consumption, which worsens the shortage in domestic supply.

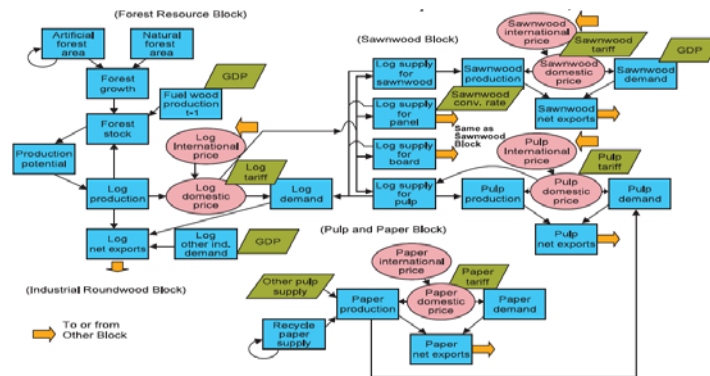
Since late 1990s, the Chinese Government has being implemented dramatic measures including "China's Natural Forest Protection Program" that bans any logging in 18 provinces to stop overlogging of natural forests. This policy was adopted due to several well-known ecological disasters, e.g. serious flooding in Yangtze River. To sustain long-term wood supply, the Central Government has also initiated a gigantic "China's Fast-Growing and High-Yield Plantation Program" to intensify the reforestation program in China.

With its rapid economic development and expansion of external trade, China has become an important producer and exporter of processed wood products, especially wood-based panels and furniture. Moreover because of its limited forest resources and increasing restrictions on domestic timber harvest to protect its fragile natural ecosystems (Zhang et al., 2000; Zhao and Shao, 2002), China may increasingly depend on imports. This raised international concerns about the potential impacts on forest conservation in other parts of the world (Mayer et al., 2005).

What would be the potential impacts of domestic forest policies on domestic and global forest product markets and on forest resource conservation. Also what will be the impact on China's imports of timber and exports of forest products if China is fully cooperative in the spirit of Lacey Act, recently passed by the U.S. Congress, setting strict requirements on the declaration of legality of wood sourcing.

The purpose of this thematic study is to establish the Spatial Equilibrium Model (SEM) for China's domestic wood product markets and apply the SEM to the assessment of China's domestic forest policies. Two policies will be assessed. One is China's Natural Forest Protection Program. The other is China's agreement to the U.S. Lacey Act, which will have profound impacts on the income of small producers/exporters.

SEM is a model solving simultaneous equilibrium of plural regional markets under the assumption of the existence of transportation costs between any two regions. The solution of this model is equivalent to the maximization of the sum of producers' and consumers' surplus minus the total transportation costs of all shipments under the constraints of production capacity and availability of primary factors. Figure 3.2 presents the flowchart of spatial multiple wood product market.



**Figure 3.2 Flowchart of multiple wood product markets**

SEM will be established for China's six major wood product markets and the rest of the world for six wood products, i.e. log, sawnwood, wood panel, veneer, fibreboard and flakeboard. To construct the model, both national and local statistics on social and economical development, forest resources, harvest, demand and production as well as firm-level production data based on survey will be necessary (see Table 3.1).

**Table 3.1 Data requirement for SEM**

Data Requirement	Description
Physical data	Firm-level and regional level production function related input-output data, intra-regional and inter-regional flows of intermediate goods and final goods, and labor requirement, etc.
Economic data	Regional demand, production capacity, price index, investment, income, transportation cost, price of other raw materials, etc.
Social data	Employment, etc.

In FY2008, a detailed research proposal based on literature review was prepared. Preparation for firm-level survey including contacts with local governments and firms and questionnaire design was also conducted. In FY2009, the following tasks will be conducted:

- (i) Field survey to four provinces/cities will be conducted to collect required data;
- (ii) Model establishment and parameter estimation; and
- (iii) Preliminary policy assessment.

This study will be integrated into the IPAM as one of the thematic models for the development of the final output of this project, the Sustainable Development Outlook in East Asia.

### 3.3 Country Review

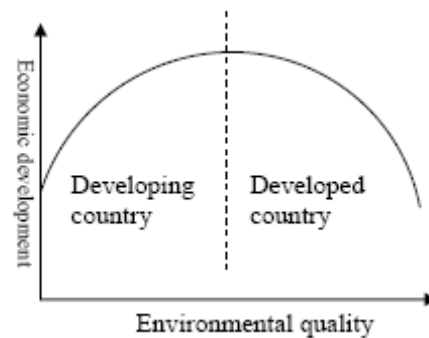
#### 3.3.1 Background

The country review papers aim to provide background of a Sustainable Development Outlook. Based on the definition of Sustainable Development based on the Brundtland

report i.e. development that meets the needs of the present without compromising the ability of future generations to meet their own needs, the SD-Outlook would like to highlight two main issues of development including the status of poverty alleviation and the ecosystem management of the region, which are the basis of the sustainable development of the society.

### 3.3.2 Consequence of economic growth

Economic growth and environment is a widely debated subject since long and there are numerous studies on identifying the causality relationship between growth and environmental quality. In the country reviews it has been argued that the Environmental Kuznets Curve (EKC), the inverted U shape relationship, predicts that the developing economies are yet to reach the highest level of environmental degradation while the developed countries are in the declining stage of environmental degradation. However, the question still remains unanswered in most of the reviews that how much the each country should be allowed to pollute for their development goals and whether achievement of growth at the costs of environment is at all a long term development or not. Amidst this dilemma, the country review identified the solution lying in the concept of sustainable



developed where a compromised economic development is suggested to have a better environmental quality and better social standard all together for a longer period of time. However, it is an empirical debate which will be further investigated in the future research activities of this project about the positioning of each country on this curve. But the recent development of the argument of a new dimension of natural resource endowment of each country has added further complexity to the whole situation which has been raised in one of these reviews. It has been observed that the poorer section of the world possesses more natural resources than the richer counterpart. Developing countries are often fallen victim to this commonly observed “natural resource curse” with their abundant natural wealth seemingly having become a liability rather than an instrument for achieving prosperity. Overall the country review papers tried to capture the most of the negative impacts of the economic development in their respective countries and tried to come out with certain improvement direction subject to further investigation.

### 3.3.3 Priority policy issues

Increasing environmental degradation and resource depletion and widespread poverty amid rapid economic growth are two great challenges faced with East Asian developing countries. Selection of proper development path decoupling environmental degradation and poverty from economic growth to ensure long-term sustainability, especially under the current global economic downturn, is fundamental and imperative task to these countries at the cross-road of sustainable development. With different social and political systems, various cultures and diversity in natural endowments, these countries are struggling with both common priority policy issues and country-specific issues.

Though manifested in different ways by individual countries, (i) to integrate sound environmental management with sound economic management; (ii) to strengthen the capacity and accountability of local governments; (iii) to facilitate better coordination both horizontally among governmental sectors and vertically between national and local governments; (iv) multi-stakeholder participation are common priorities among others.

Other selected country-specific priority issues for four countries are summarised as Table 3.2

**Table 3.2 Country-specific priority issues for four countries**

Country-specific priority issue	China	India	Lao PDR	The Philippines
Wider application of market-based instruments	√			√
Achieving greater efficiency in resource and energy use	√	√	√	√
Community-based management and sustainable use of natural resources		√	√	√
Income disparity	√	√		
Industrial structure	√			
Management of knowledge (information, technology and indigenous knowledge)	√			√
Underdevelopment			√	

### 3.3.4 Existing national laws/policies and their implementation and enforcement

For most of the selected countries, great progress has being made in formulating environmental laws, regulations, national master plans, programs and other policies to address the environmental consequences of rapid economic growth and priority issues in achieving national sustainable development target. Many countries are observed to have relevant and comprehensive environmental policies in place, however, environmental degradation, resource depletion and poverty issue are still worsening mostly due to failures in their implementation and enforcement. Three areas of these failures, i.e. legal failures, law enforcement failures and coordination failures are summarised in Table 3.3.

**Table 3.3 Major failures in implementation and enforcement**

Major failures	China	India	Lao PDR	The Philippines
Legal failures <i>Inconsistency and ambiguities in laws and policies</i>		√		√
Law enforcement failures <i>Lack of political capacity</i> <i>Ineffective local implementation</i> <i>Corruption</i>	√	√	√	√ √ √
Coordination failures <i>Institutional fragmentation</i> <i>Overlapping, duplication and competition among</i>	√	√	√	√ √
Failures in applying policy mix <i>Heavily dependent on command and control measures</i> <i>Lack of multi-stakeholder participation</i>	√ √	√		√ √
Insufficient capacity <i>Insufficient financial capacity</i> <i>Insufficient human capacity</i>	√	√ √	√ √	

### 3.3.5 Future research agenda

By the stock-taking of the environmental consequences due to rapid economic development witnessed in the East Asian countries and by identification of the national priority policy issues related to the implementation and enforcement provided in each country review paper, the agenda for future research under ERIA-SD project is proposed as follows:

- (i) Environmental sustainability, poverty reduction and economic growth are envisaged as three dimensional challenges facing by the developing countries in East Asia. Though these are recognized by most of the countries, but how to achieve a win-win-win policy is still an imperative task for the decision-makers. To help decision-maker, this project will develop certain quantitative policy assessment tools for various purposes to effectively develop and then successfully implement them under different development scenarios in future.
- (ii) Majority of the countries recognized their failure of effective implementation and enforcement of environmental laws and regulations as the major hurdle to see the expected outcomes on ground. This project will emphasize on quantitative analysis to identify major factors contributing to these failures and will provide pragmatic policy improvement recommendations thereafter.
- (iii) Further research will be required to recognize the need of the day like the impacts of on-going global economic recession and its long term impacts on the future direction of the environmental policies especially in the developing countries. Focus should be given on the new opportunities for the environmental policy implementation arising amidst this economic downturn. Global Green New Deal proposed by the United Nations can be further investigated on a country specific manner for identifying a win-win policy, too.

- (iv) For policy implementation, we will focus on innovative measures on economic incentives, community-based approach for the management and use of natural resources, and multi-stakeholder participation as highlighted in the country review papers.
- (v) Last, but not the least, to frame good governance at both national level and regional level should also be addressed in the future.

## References

1. Berrittella, Maria, A. Y. Hoekstra, K. Rehdanz, R. Rosond, R.S.J. Tol. 2007. "The economic impact of restricted water supply: A computable general equilibrium analysis". *Water Research* 41: 1799-1813.
2. Dasgupta, Susmita, A. Mody, S. Roy, and D. Wheeler. 2001. "Environmental regulation and development: a cross-country empirical analysis". *Oxford Development Studies* 29: 173-187.
3. Kojima, Satoshi. 2008. REPA Model for Impact Assessment of Environmental Policies under Regional Economic Integration in East Asia. IGES EA Working Paper 2008-001. Hayama: IGES.
4. Kojima, Satoshi. 2007. Sustainable Development in Water-stressed Developing Countries: A Quantitative Policy Analysis. Cheltenham: Edward Elgar.
5. Lee, Huey-Lin. 2004. Incorporating Agro-Ecologically Zoned Land Use Data and Landbased Greenhouse Gases Emissions into the GTAP Framework. West Lafayette, IN: Center for Global Trade Analysis.
6. Max-Neef, Manfred. 1992. Development and human needs. In *Real-life Economics: Understanding Wealth Creation*, edited by P. Ekins and M. Max-Neef. London: Routledge.
7. Mayer, A., Kauppi, P., Angelstam, P., Zhang, Y., Tikka, P., 2005. Importing timber and exporting ecological impact. *Science* 308, 359-360.
8. Neumayer, Eric. 1999. Weak versus Strong Sustainability: Exploring the Limits of Opposing Two Paradigms. Cheltenham: Edward Elgar.
9. Zhang, P., Shao, G., Zhao, G., Le Master, D., Parker, G., Jr., Dunning, J. Jr., et al. 2000. China's forest policy for the 21<sup>st</sup> century. *Science* 288, 2135-2136.
10. Zhao, G., Shao, G., 2002. Logging restrictions in China: A turning point for forest sustainability. *Journal of Forestry* 100, 34-37.