

Introduction

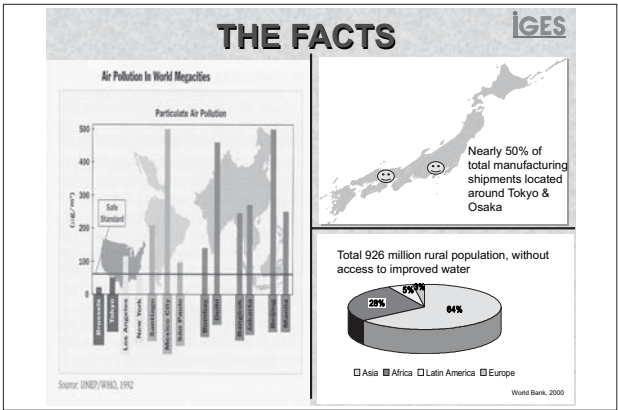
# The Brilliance of Eco-Industrial Clusters in Urban-Rural Fringe Areas: From Experience to Strategy

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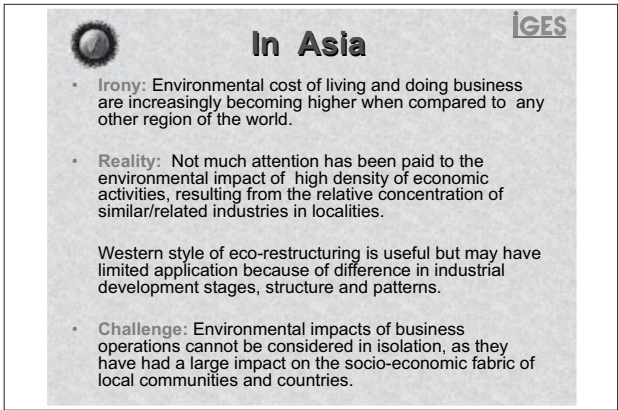
There are three facts which challenge us today. Before getting into the discussion on Eco-industrial clusters, I would like to draw your attention to these three facts. One is the air pollution in the mega cities that has been increasing and goes beyond safe standards. Second one as shown in the case of Japan, which is true to other countries also, nearly 50% of the shipments are originated from the major cities like Tokyo and Osaka. Third, there are 926 million of the people living in the rural areas of the world who do not have access to safe water because of the economic constraints as well as environmental conditions.



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But the reality is that not much attention has been paid to the environmental impact of high density economic activities. This is, what we will call, the industrial clusters, resulting from the relative concentration of similar or related industries in localities. Of course, we have the solutions like western style of eco-

restructuring. One example is Japanese eco-towns. They are very useful to developing Asia, but may have limited applications because Asia has different industrial structure, development patterns, and also the development stage. And also the challenge is that, this environmental impact of industrialization cannot be considered in isolation, because in developing Asia, industrialization has the impact on the socio-economic fabric of the society. So we think, eco-industrial clusters - developing eco-industrial clusters in the urban-rural fringe areas provide a feasible solution.



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In this presentation, I would like to explain the basic concepts of eco-industrial clusters, and then explain what types of industrial clusters exist in Asia. Then, we will move on to see how we can transform them into eco-friendly economic zones, and then finally we will end up with what kinds of strategies are

feasible for developing Asia.

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### Outline

- Basic Concepts on Eco-Industrial Clusters
- Do industrial clusters exist in Asia?  
- Fact findings in Thailand, Vietnam, India and Japan
- How to transform them into eco-friendly economic zones?  
- Stakeholder Consultation  
- Case studies on Functional Eco-industrial Clusters
- Strategies for Integrated Environmental and Economic Planning at Local Level.

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What is an eco-industrial cluster? For this project, eco-industrial cluster (EIC) is defined as the community of business or the geographic concentration of interconnected companies in a specialized field that cooperate with each other and also with the local community to efficiently share the resources. These resources may be materials, energy, water, infrastructure and also environmental information. This leads to the improved environmental quality, economic gains, and equitable enhancement of human resources in that locality.

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### Eco-Industrial Cluster (EIC)

A community of business - geographic concentration of interconnected companies in a specialized field -that cooperate with each other and with local community to efficiently share resources (materials, energy, water, infrastructure, information, finance, etc)-, leading to improved environmental quality, economic gains, and equitable enhancement of human resources for the business and local community.

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There are some definitions. The key words in the ECO, that is, 3Es of Ecology, Economy, and Equity, then industrial clusters as defined by Prof. Michael Porter of the Harvard Business School that gives the stage of competitiveness and also eco-networks that is happening between the companies. Urban-rural fringe areas - a hinterland between the cities, towns

and the villages, of course, often these boundaries are very dynamic and very rarely they conform to the administrative ones.

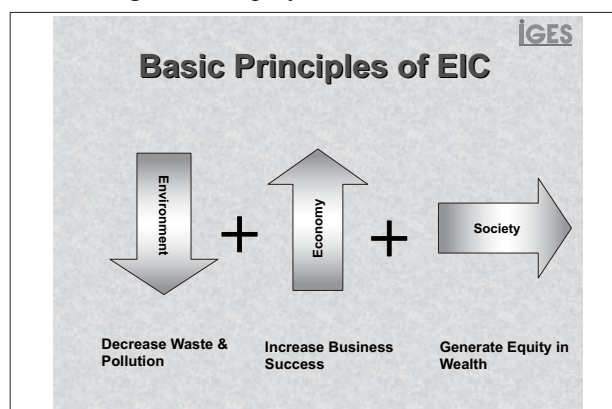
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### Some Definitions

- **ECO** – 3Es Ecology, Economy and Equity
- **Industrial Clusters** – Geographically proximate group of interconnected companies in a particular field, linked by commonalities and complementarities (Porter, 1998).
- **Eco-Networks** – All types of enterprise operations in which local materials, energy and water as well as labor are utilized among the companies in an efficient way (Wallner, 1999).
- **Urban-rural fringe areas:** Hinterland between cities/towns and villages, the boundaries of which are dynamic and rarely conforms to administrative one.

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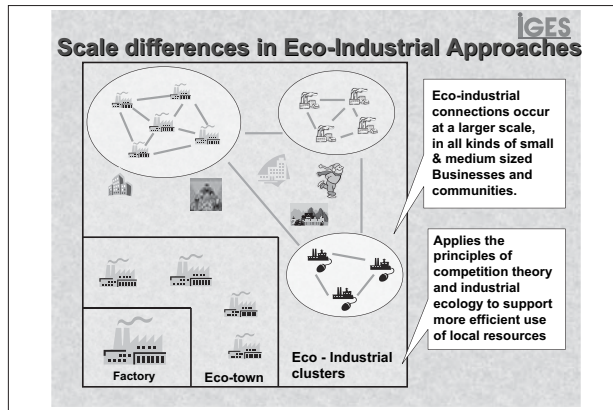
The basic operating principles of EIC, as explained earlier, are to decrease the pollution and the waste, increase the business opportunities or the success as well as to generate equity in the wealth creation.



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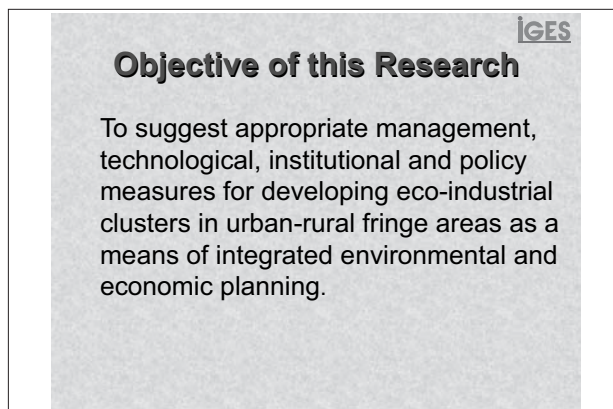
This illustration shows the advantage of thinking about the eco-industrial strategies at different levels. Here, at the factory level, for pollution abatement end-of-pipe technology is more suitable. The next level, we have the eco-towns where recycle-based environmental business companies are located. But for Eco-industrial clusters, we think a little bit larger at the regional scale, where possibilities for mutually beneficial environmental connections increase the chance of economic success. Basically what is different here is, we are dealing with the region where the people live and knowledge institutions are located and also the re-

sources are many. This industrial clusters applies the theory of or the principles of competition and industrial ecology to support more efficient use of locally available resources. In other words, they are the Asian version of Japanese eco-towns.



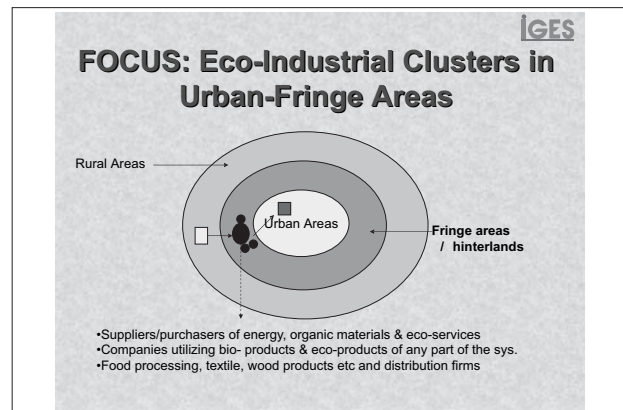
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The objective of this research is set as to suggest appropriate management, technological, institutional and policy measures for developing eco-industrial clusters in the urban-rural fringe areas as a means of integrated environmental and economic planning at local level.



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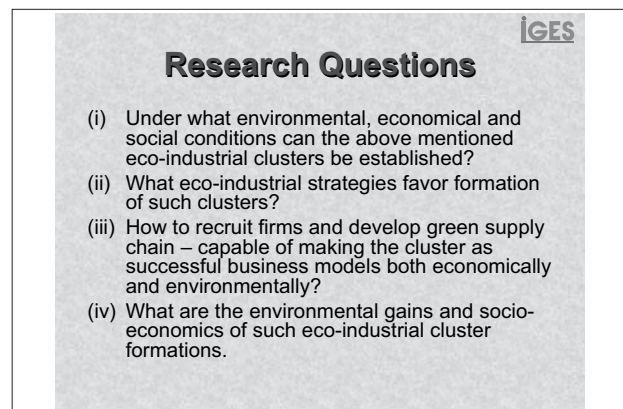
This research gives more focus or emphasis on the eco-industrial clusters in the urban-fringe areas because we believe these urban-fringe areas have many strategic advantages. They are the part of same economic systems of the urban areas as well as becoming a part of environmental system of the rural areas. As a result, we have numerous different types of environmental and economic linkages that derive a lot of



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business opportunities.

This research, try to answer these following four questions. Under what environmental, economical and social conditions these above mentioned eco-industrial clusters can be established, and what type of eco-industrial strategies whether the technology transfer, or the social capital creation, or the eco-networks favor formation of such clusters? How to recruit the firms or the companies and develop green supply chain, then what are the environmental gains and the socio-economics of such cluster formations?



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This research adopted three approaches. First, we started with the fact finding surveys of locating existing industrial clusters in Asia, then we moved to the stakeholder consultations to identify what are the driving forces that exist at the local level. The third stage, - the final stage, where now we are conducting the case study analysis of techno-policy, and also the environmental economic linkages.

### Research Approach

- 1. Fact Finding Surveys**  
- Locating/grouping existing clusters, supply and market chains, policies etc.
- 2. Stakeholder Consultations**  
- identifying driving forces of local eco-industrial initiatives from different perspectives.
- 3. Case Study Analysis**  
- SWOP analysis; techno-policy; environment - economic linkages.

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This study is implemented in four countries, namely Japan, Vietnam, Thailand and India. Of course, we are doing it in partnership with the other local research institutes. Why did we select these countries? Because they represent the diversification of industrial structure in developing Asia. Also, these countries are somehow successful in developing eco-industrial cluster concepts, so we selected these countries.

Do clusters exist in Asia?

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This is the road map of our project. This all started just about one year ago. We started with the literature survey, followed by field surveys, stakeholder meetings that culminate into the workshop today, and, we are planning to publish the first IGES Source Book on eco-industrial clusters hopefully by the early next year.

Now, I report the results of fact finding surveys - what we found from the field. Do industrial clusters exist in Asia and what are the policy and the environ-

### Road Map for the Research

**FY 2005**

- Literature review, Information collection in Japan
- Standardizing RP & Field Visit (Dec 05)
- Case Study I & SWOP Analysis [Japan, March 06]
- Regional Fact File on Eco-industrial clusters (Mar 06) [Thailand, India, Vietnam]
- Case Study II ~ IV & SWOP Analysis (Sep 06)

**FY 2006**

- Intn'l Consultative Meeting (Oct 06)
- Synthesis (Dec 06)
- General Analysis on industry environment policy instrument, business strategies. (Oct 06)
- Publication of an IGES Source Book (Jan 07)

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### Component 1

#### Country Fact Finding Surveys

Do industrial clusters exist in Asia and what are policy and environmental impacts?

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mental impacts? Yes, we found industrial clusters do exist in Asia.

In Vietnam, we find about a 1,500 trade villages contributing roughly about 25% of the GDP of Vietnam.

### Types and Distribution

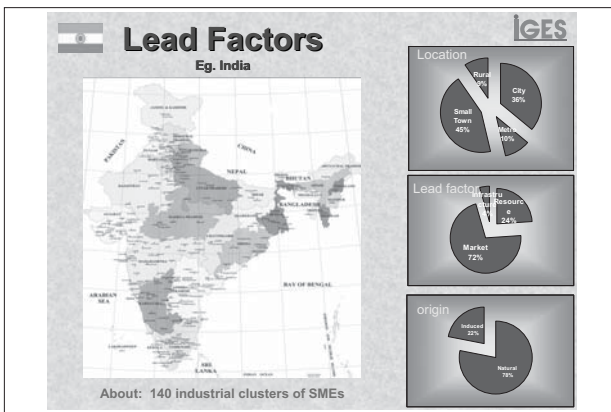
Eg. Vietnam

Location	North	Central	South
Textile, silk, leather	139	24	10
Food proc., materials	145	42	21
Waste recycling	64	24	5
Handicrafts	398	121	87
Constru. material	19	9	3
Others	211	77	42

about 1,450 trade villages  
About 25% (!) of GDP is from these clusters located in urban/rural fringe areas

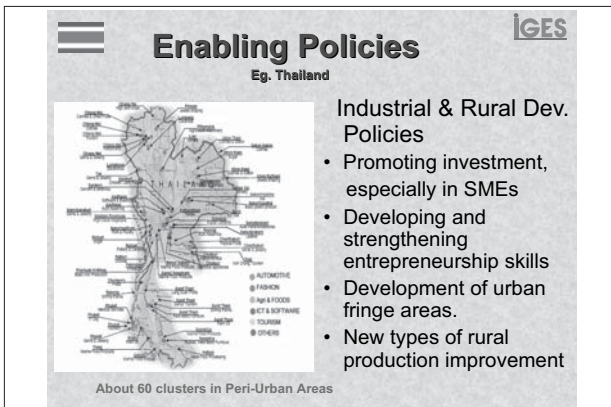
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In India also, we identified about 140 clusters located, particularly in the small towns or the fringe areas of the urban centres. They are driven by market mechanisms as well as different policies.



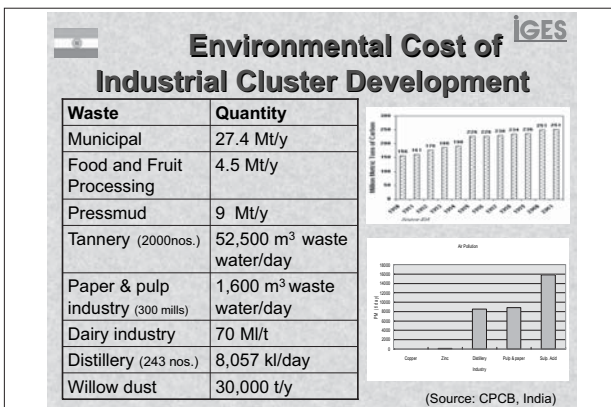
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In Thailand, we found about 60 clusters located in the peri-urban areas. They are promoted by the industrial development as well as the rural development policies of that particular government. Of course, the environmental impact of these clusters is not well quantified.



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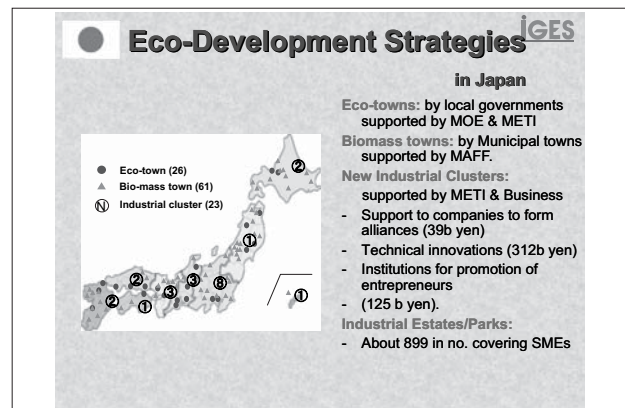
These are the some data that can show you the magnitude of the environmental impacts of these clusters.



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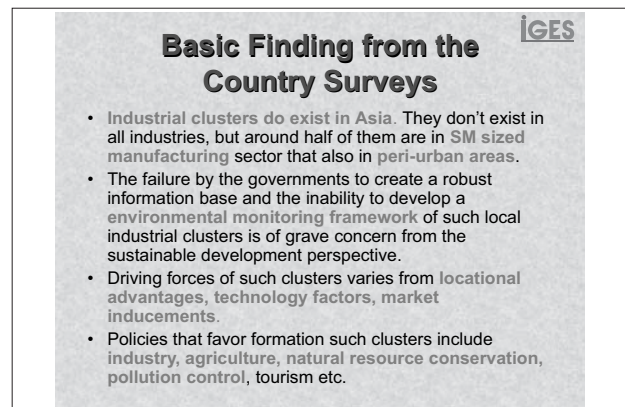
tered industrial activities.

Japan is leading Asia with innovative environmental strategies. Here we have about 26 eco-towns and also biomass towns, and Maniwa, in Okayama - our case study cluster - is one of them, and there are also other types of industrial clusters, including about 23 new industrial clusters. In addition, we have the industrial estates about 900 in numbers covering small and medium enterprises. The environmental impact of the last two has not yet been quantified.



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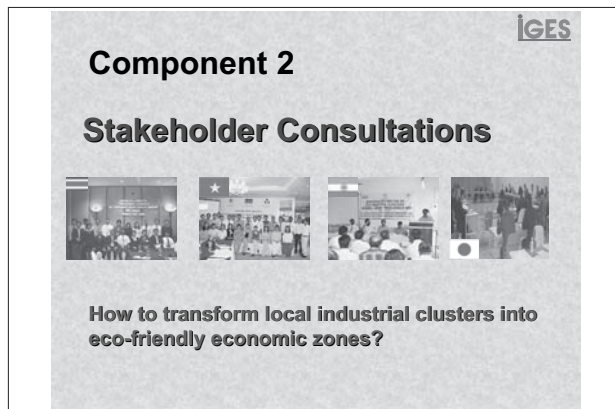
What are the findings from the survey? It is summarized as follows. Industrial clusters do exist in Asia, but they do not exist in all industries. We also found that around half of them are in small and medium sized industries, located in the peri-urban areas. We also found the failure by the governments to create a robust information base and the inability to develop the environmental monitoring framework of such local industrial clusters. They give a grave concern.



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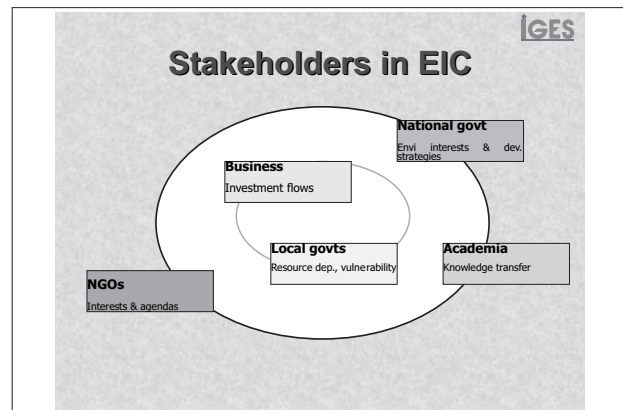
cern from the sustainable development perspective. We also found that driving forces of such clusters varies from local advantages, local human resources, the technology factors, market inducement and also the policies. We found the policies that favor the formation of such clusters include the industry, agriculture, or rural development, natural resource conservation as well as the pollution control.

After completing the fact finding surveys, we made stakeholder consultations. The aim was to collect different perspectives on how to transform these local industrial clusters into eco-friendly economic zones. We conducted or consulted the stakeholders in Thailand, Viet Nam and India and also we participated in a meeting in Maniwa, Okayama.



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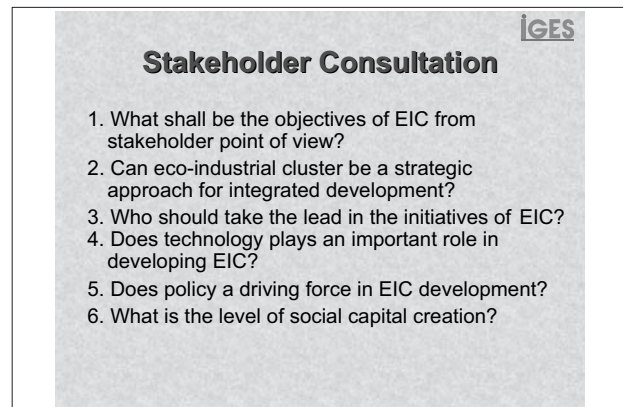
Who are the stakeholders in EIC? There are two tiers of stakeholders. At the local level, they are business communities and the local governments. They are very much particularly interested in investment flows and also the local governments, because they are more concerned about the resource development and the vulnerability of the local environment to development. In the second tier, we have the national governments or the prefectural governments. Their interests are in preserving the environment as well as formulating the development strategies. In this network we also have the knowledge institutions like local universities for the knowledge transfer as well as the NGOs, who have interest for environment as well as the development agenda.



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Most of our stakeholder consultations are designed to derive the answers for these following six questions. What shall be the objectives of these eco-industrial clusters? Can eco-industrial cluster be a strategic approach for integrated development? Who should take the lead? Does technology play an important role? etc.

These are the data on stakeholder representation. In



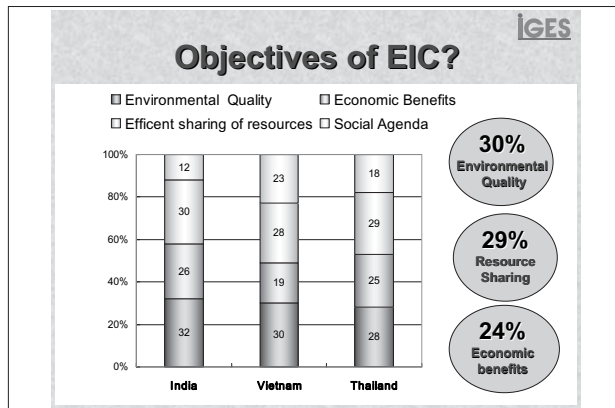
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	Total No	Policy makers	Business	NPO	Academia
Thailand	23	15%	55%	15%	15%
Vietnam	27	29%	55%	0%	15%
India	70	25%	10%	20%	45%

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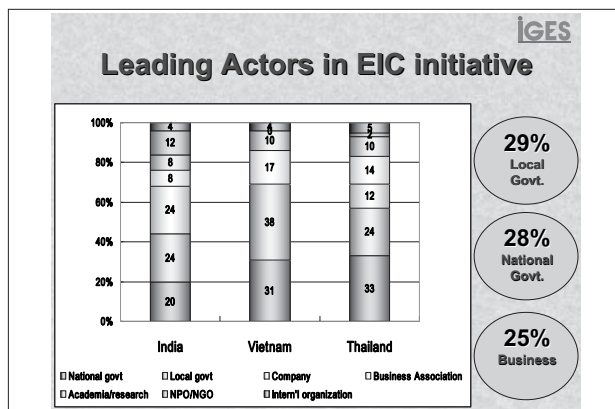
all the stakeholder consultations in Thailand, Vietnam, and India, we found a fair and balanced representation from the policymakers, business, NPOs and academia.

The objectives of these industrial clusters were also found to vary. They may be environmental quality, the resource sharing, or the economic benefit as expressed by the business community.



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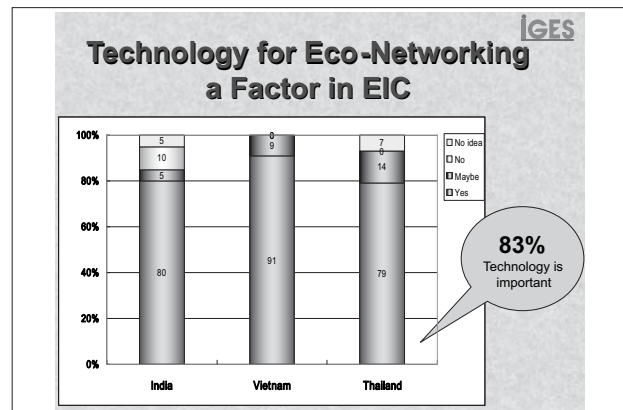
The leading actors for the EICs are predominantly local governments and also the national government as well as business partnerships.



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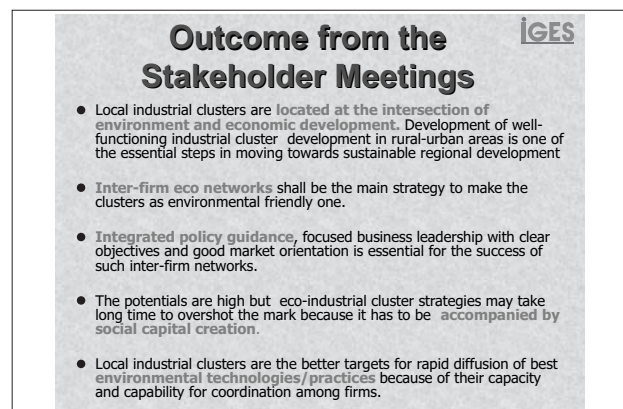
Technology is an important factor in developing the eco-networks.

What is the outcome of this stakeholder meeting? That can be summarized as follows. The local industrial clusters are located at the intersection of the environment and the economic development. Development of a well-functioning industrial cluster in rural-urban fringe area is one of the essential steps in mov-



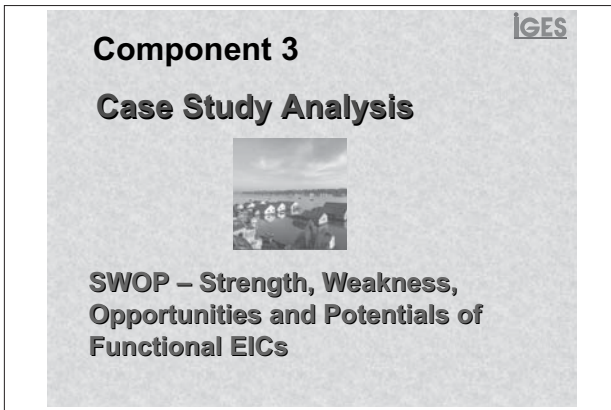
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ing towards or moving Asia towards sustainable regional development. We also concluded that inter-firm eco-networks shall be the main strategy to make the industrial clusters as environmental friendly one. We also concluded that integrated policy guidance, and also the focused business leadership with clear objectives and good market orientation is essential for the success of such inter-firm networks, which we got from Maniwa. And also we learned from Thailand cases and also Vietnam that the potentials are high, but eco-industrial cluster strategies may take a long time to overshoot the mark because it has to be accompanied by the social capital creation. From India, we also learned that these local industrial clusters are the better targets for rapid diffusion of best environmental technologies because they are clustered together. And also they have the capacity and capability for coordination among the firms.



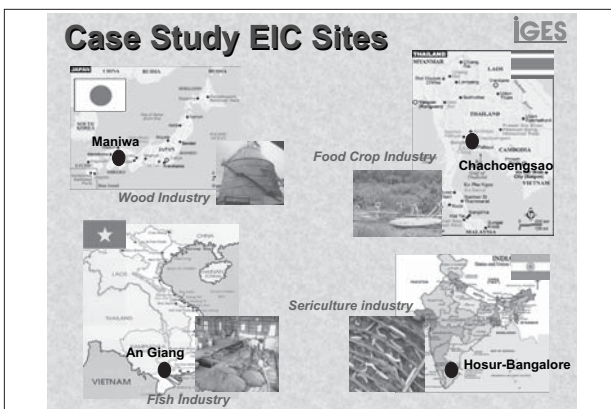
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After the stakeholder consultations, we moved into actually evaluating the functional eco-industrial clusters located in the urban-fringe areas. There we did the SWOP - strength, weakness, opportunities, and the potentials analysis of functional EICs.



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These are our case study EICs. We selected wood industry in Maniwa, food crop industry in Thailand, fish industry in An Giang province of Vietnam, and sericulture industry in India for case study analysis. The details of these case study sites will be presented by our partners, who are here with us today.



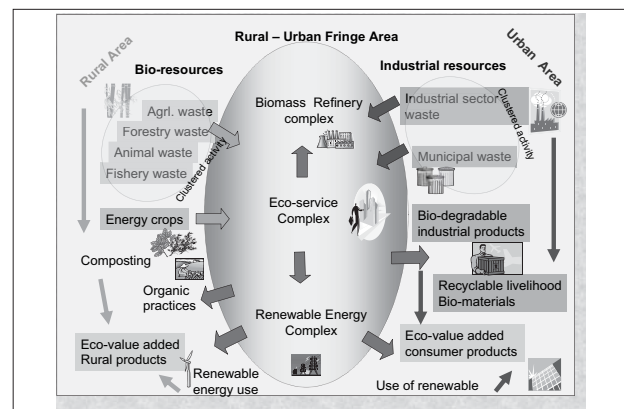
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What we did with all these clusters is we concentrated on analyzing the environmental and economic linkages that exist between rural areas and also the urban-fringe areas. There are potentials for resources supply in the both sides of upper portion. Resources both bio and the industrial waste resources are supplied to markets, which are under developed at present. If this system is optimized, the resources can

be supplied well to the under-served markets. Numerous types of environment and economic linkages exist by development of the clusters and also through formulation of eco-inter-firm networks.

What was analyzed in all these case studies are; how these eco-networks evolved in constructing a value chain or the supply chain; what sort of policies favor establishment of eco-networks within these clusters; whether right kind of technologies are available to make this material flow to happen, and also what is the role of social capital in this adventurous business operations.

To summarize, it can be said that the competitive advantage of this rural-urban fringe area is that it has large pool of unutilized resources available in the rural areas as well as the industrial areas, and these are strategically located in such a way that they have close access to the urban networks, and also large and diversified pool of human resources available in the urban areas as well as the rural areas. Back office support systems like eco-service concepts can also possibility to be evolved in these areas.

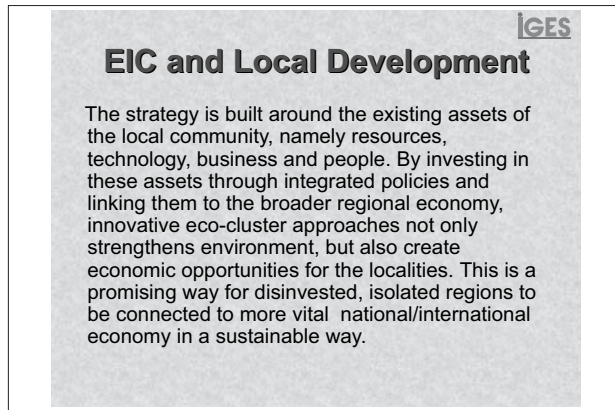


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What can be concluded from these case study analysis is that a strategy in developing eco-industrial clusters and linking to the local development, which would be like this; to build around the existing assets of local community namely resources, local resources, the technology, business and also the people. By investing in these assets through integrated policies and linking them to the broader regional econ-

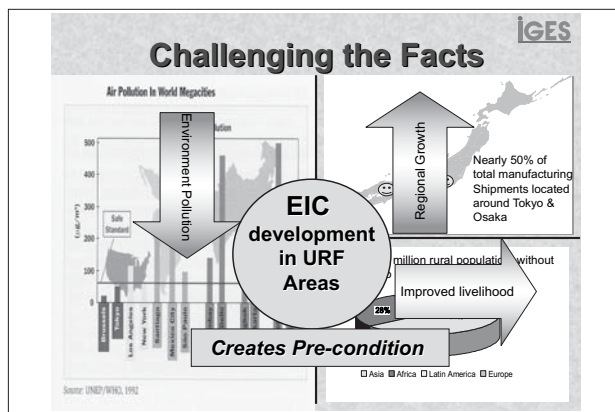


omy innovative eco-cluster approaches not only strengthens the local environment, but also create economic opportunities for the localities. This is the only promising way for these disinvested regions or isolated regions to be connected to the global economy.



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Coming to the first slide, how the facts can be challenged? Eco-industrial cluster development in the urban-fringe areas creates the preconditions for reducing the environmental pollution, contributes for a balanced regional growth among the regions, and also improves the livelihood conditions in rural areas.



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Sustainable development is a very long path and everybody has a role. Every individual can participate in this process. The opportunities are there for every

individual as well as every company - here, you all can also support or also become a part of the IGES research process. You are provided with a questionnaire, and please respond to it by giving your opinions about eco-industrial clusters.




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With this, I conclude my presentation and thank you very much for your kind attention. Our special thanks also goes to our partners, who are with us here, Maniwa Municipal Government, Okayama; the Asian Institute of Technology, Bangkok, Thailand; Ho-chi Minh City University of Technology, Ho Chi Minh City, Vietnam; and also the Anna University, Chennai, India. Thank you very much.




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## The Brilliance of Eco-Industrial Clusters in Urban-Rural Fringe Areas of Asia


### - From Experience to Strategies -

都市農村境界域における環境調和型産業クラスターの可能性: 経験から戦略へ



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主任研究員 V. アンブモリ

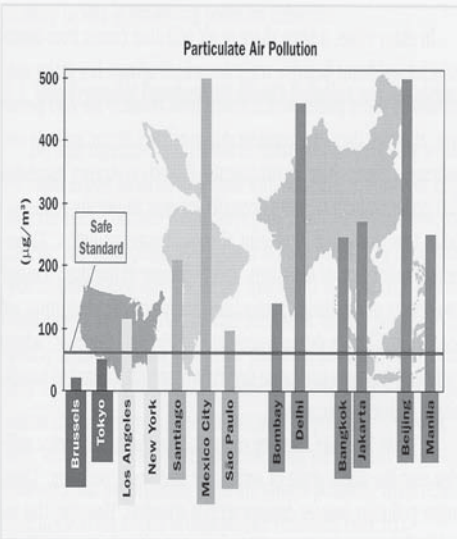
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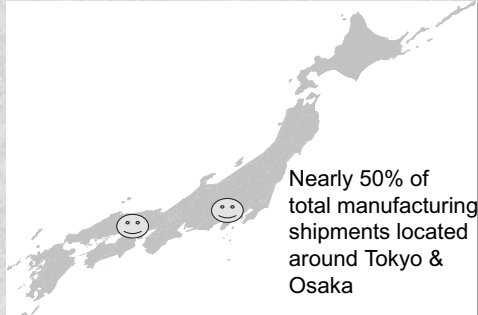
## THE FACTS

### Air Pollution In World Megacities

Particulate Air Pollution

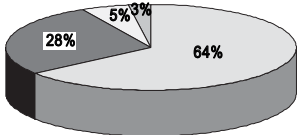


Source: UNEP/WHO, 1992



Nearly 50% of total manufacturing shipments located around Tokyo & Osaka

Total 926 million rural population, without access to improved water



World Bank, 2000

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## In Asia

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- **Irony:** Environmental cost of living and doing business are increasingly becoming higher when compared to any other region of the world.
- **Reality:** Not much attention has been paid to the environmental impact of high density of economic activities, resulting from the relative concentration of similar/related industries in localities.

Western style of eco-restructuring is useful but may have limited application because of difference in industrial development stages, structure and patterns.

- **Challenge:** Environmental impacts of business operations cannot be considered in isolation, as they have had a large impact on the socio-economic fabric of local communities and countries.

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## Outline

- Basic Concepts on Eco-Industrial Clusters
- Do industrial clusters exist in Asia?
  - Fact findings in Thailand, Vietnam, India and Japan
- How to transform them into eco-friendly economic zones?
  - Stakeholder Consultation
  - Case studies on Functional Eco-industrial Clusters
- Strategies for Integrated Environmental and Economic Planning at Local Level.

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## Eco-Industrial Cluster (EIC)

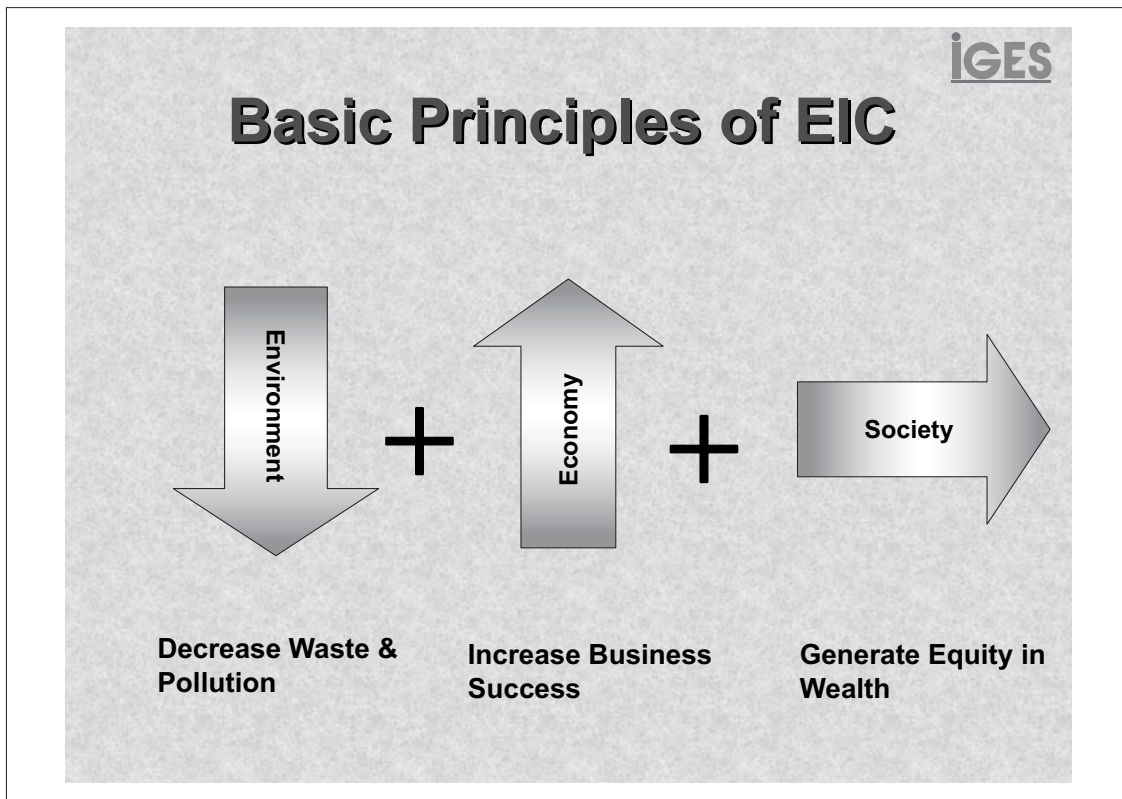
A community of business - geographic concentration of interconnected companies in a specialized field -that cooperate with each other and with local community to efficiently share resources (materials, energy, water, infrastructure, information, finance, etc)-, leading to improved environmental quality, economic gains, and equitable enhancement of human resources for the business and local community.

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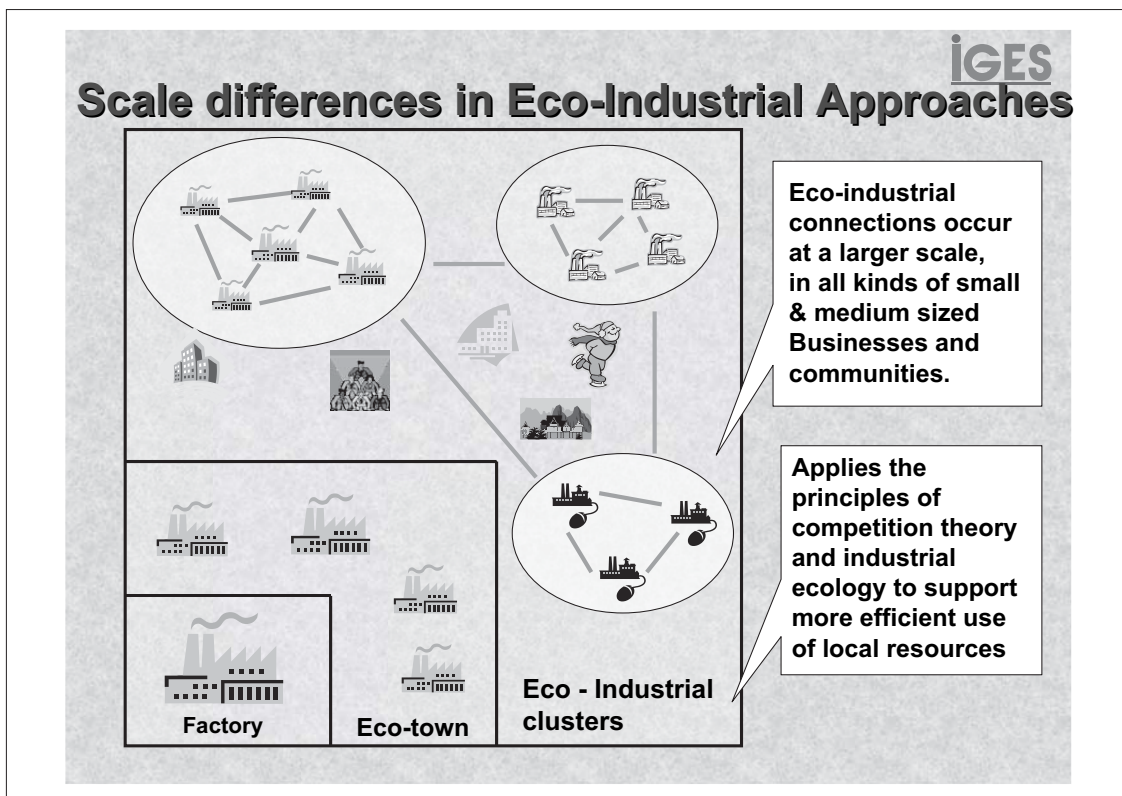
## Some Definitions

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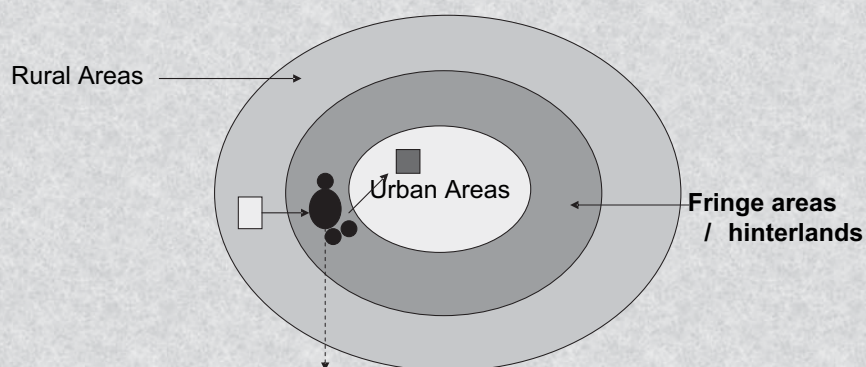
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## Objective of this Research

To suggest appropriate management, technological, institutional and policy measures for developing eco-industrial clusters in urban-rural fringe areas as a means of integrated environmental and economic planning.

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## FOCUS: Eco-Industrial Clusters in Urban-Fringe Areas



- Suppliers/purchasers of energy, organic materials & eco-services
- Companies utilizing bio- products & eco-products of any part of the sys.
- Food processing, textile, wood products etc and distribution firms

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## Research Questions

- (i) Under what environmental, economical and social conditions can the above mentioned eco-industrial clusters be established?
- (ii) What eco-industrial strategies favor formation of such clusters?
- (iii) How to recruit firms and develop green supply chain – capable of making the cluster as successful business models both economically and environmentally?
- (iv) What are the environmental gains and socio-economics of such eco-industrial cluster formations.

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## Research Approach

### 1. Fact Finding Surveys

*- Locating/grouping existing clusters, supply and market chains, policies etc.*

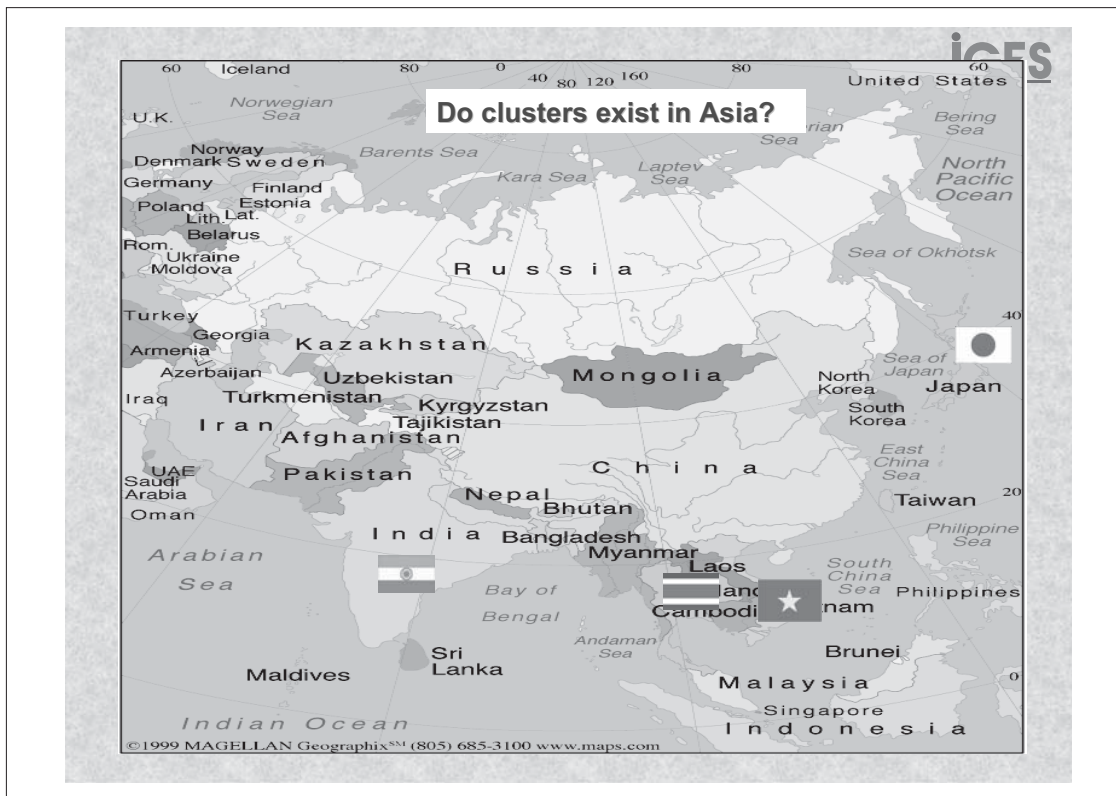
### 2. Stakeholder Consultations

*- identifying driving forces of local eco-industrial initiatives from different perspectives.*

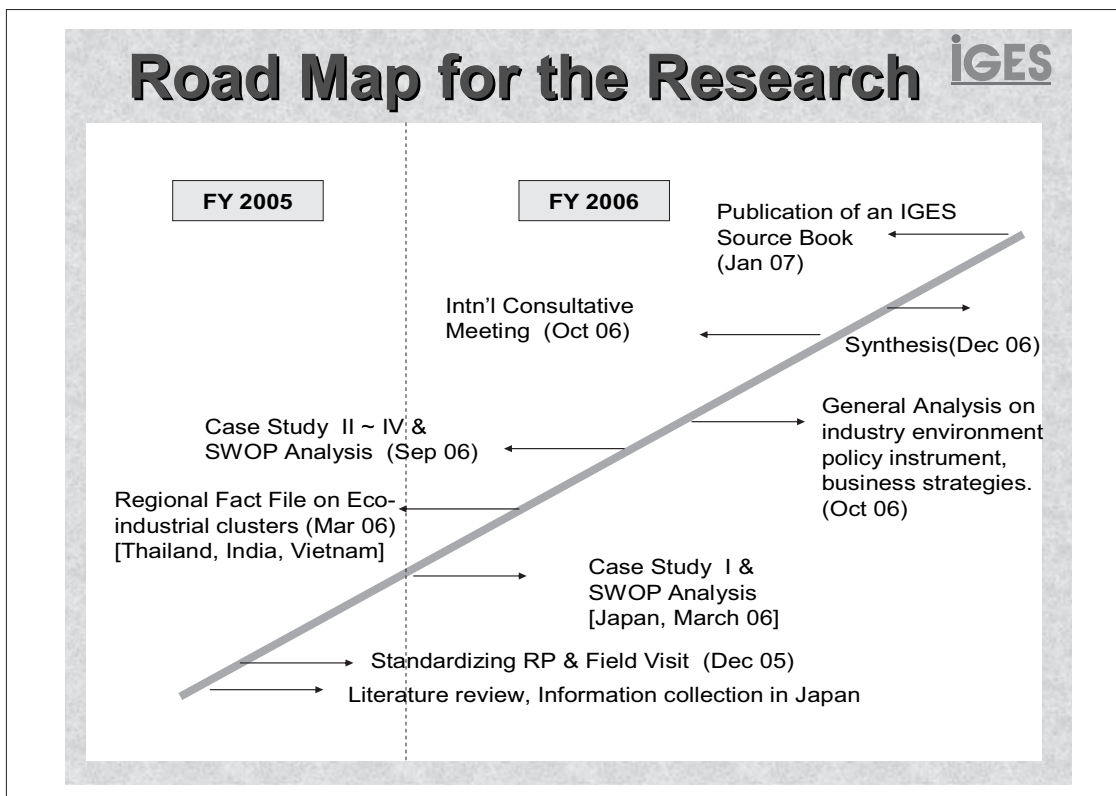
### 3. Case Study Analysis

*- SWOP analysis; techno-policy; environment - economic linkages.*

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Slide 14



# Component 1

## Country Fact Finding Surveys

### Do industrial clusters exist in Asia and what are policy and environmental impacts?

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## Types and Distribution

Eg. Vietnam

Location	North	Central	South
Textile, silk, leather	139	24	10
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about 1,450 trade villages  
About 25% (!) of GDP is from these clusters located in urban/rural fringe areas


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## Lead Factors

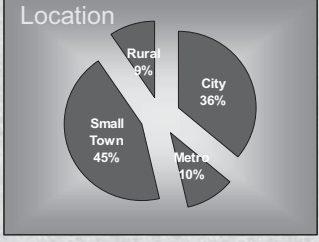
Eg. India



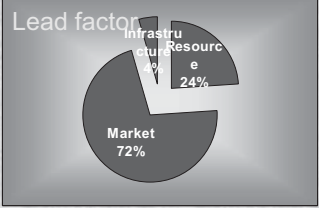


About: 140 industrial clusters of SMEs

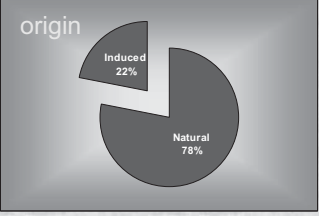
**Location**




**Lead factor**



**origin**




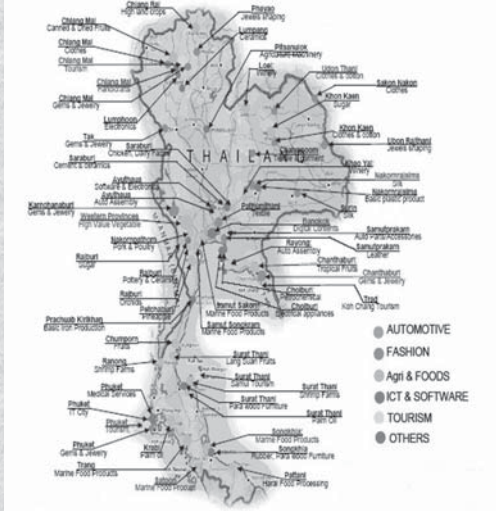
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## Enabling Policies

Eg. Thailand





About 60 clusters in Peri-Urban Areas

### Industrial & Rural Dev. Policies

- Promoting investment, especially in SMEs
- Developing and strengthening entrepreneurship skills
- Development of urban fringe areas.
- New types of rural production improvement

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## Environmental Cost of Industrial Cluster Development

Waste	Quantity
Municipal	27.4 Mt/y
Food and Fruit Processing	4.5 Mt/y
Pressmud	9 Mt/y
Tannery (2000nos.)	52,500 m <sup>3</sup> waste water/day
Paper & pulp industry (300 mills)	1,600 m <sup>3</sup> waste water/day
Dairy industry	70 MI/t
Distillery (243 nos.)	8,057 kl/day
Willow dust	30,000 t/y

Source: EPA

(Source: CPCB, India)

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## Eco-Development Strategies in Japan

● Eco-town (26)  
▲ Bio-mass town (61)  
Ⓝ Industrial cluster (23)

**Eco-towns:** by local governments supported by MOE & METI

**Biomass towns:** by Municipal towns supported by MAFF.


**New Industrial Clusters:** supported by METI & Business

- Support to companies to form alliances (39b yen)
- Technical innovations (312b yen)
- Institutions for promotion of entrepreneurs (125 b yen).

**Industrial Estates/Parks:**

- About 899 in no. covering SMEs


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## Basic Finding from the Country Surveys


- **Industrial clusters do exist in Asia.** They don't exist in all industries, but around half of them are in **SM sized manufacturing sector** that also in **peri-urban areas**.
- The failure by the governments to create a robust information base and the inability to develop a **environmental monitoring framework** of such local industrial clusters is of grave concern from the sustainable development perspective.
- Driving forces of such clusters varies from **locational advantages, technology factors, market inducements**.
- Policies that favor formation such clusters include **industry, agriculture, natural resource conservation, pollution control, tourism etc.**

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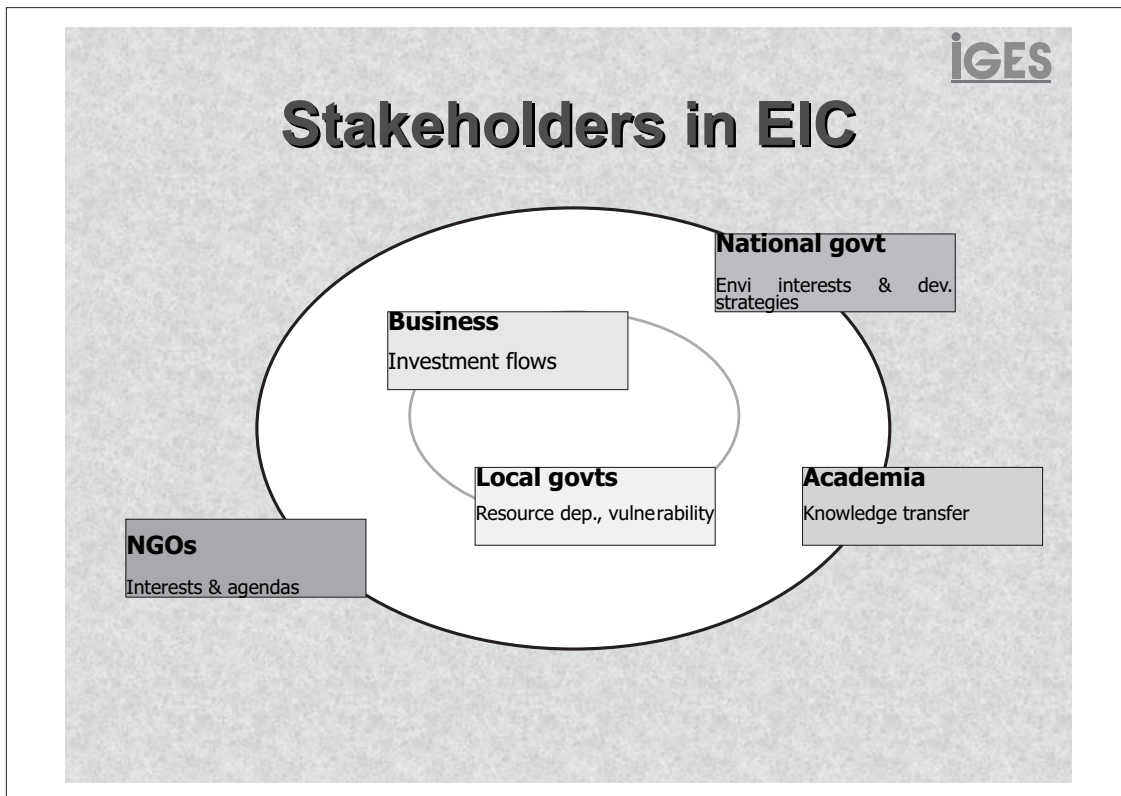
## Component 2

### Stakeholder Consultations



**How to transform local industrial clusters into eco-friendly economic zones?**

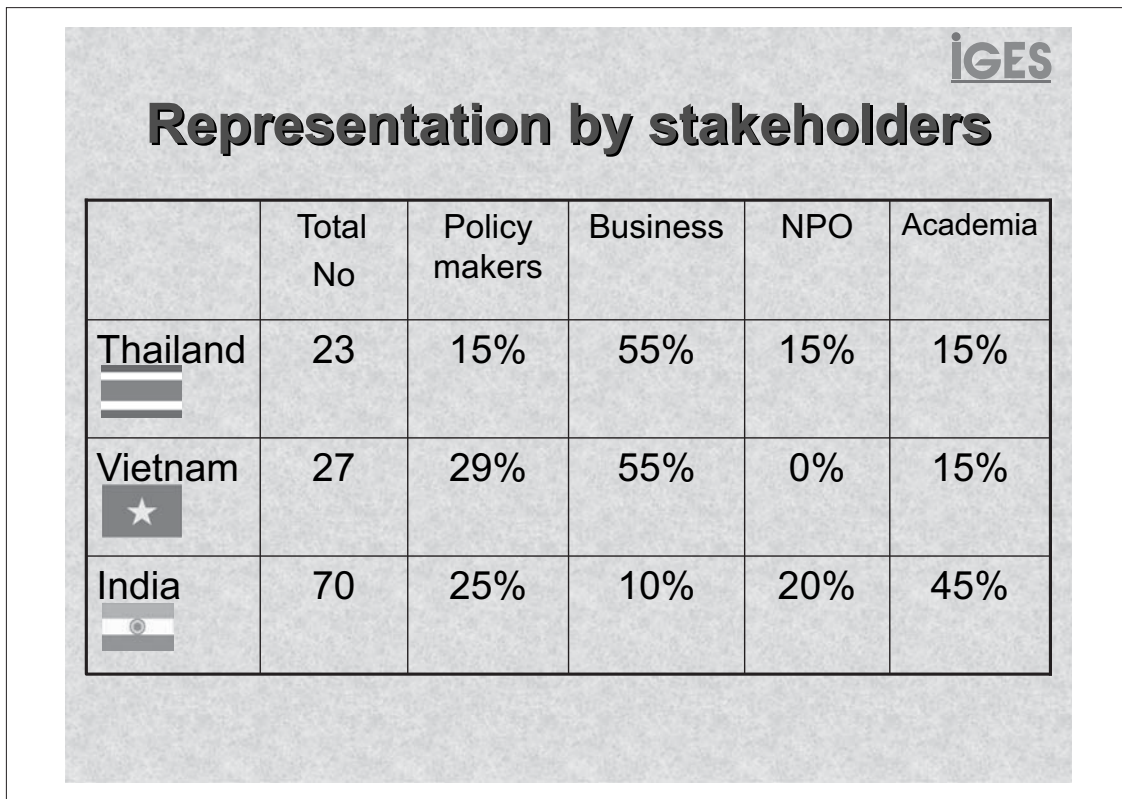
Slide 21



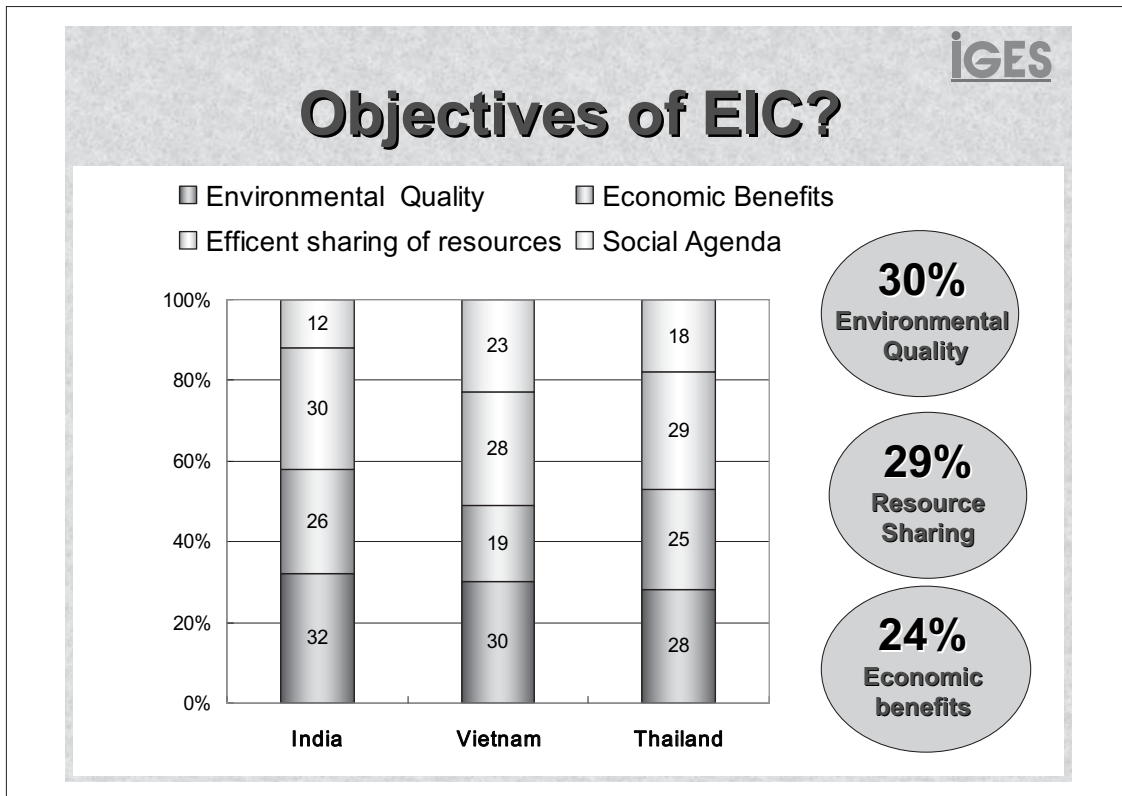
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- 
- The slide, titled "Stakeholder Consultation", lists six key questions for consideration:
1. What shall be the objectives of EIC from stakeholder point of view?
  2. Can eco-industrial cluster be a strategic approach for integrated development?
  3. Who should take the lead in the initiatives of EIC?
  4. Does technology plays an important role in developing EIC?
  5. Does policy a driving force in EIC development?
  6. What is the level of social capital creation?

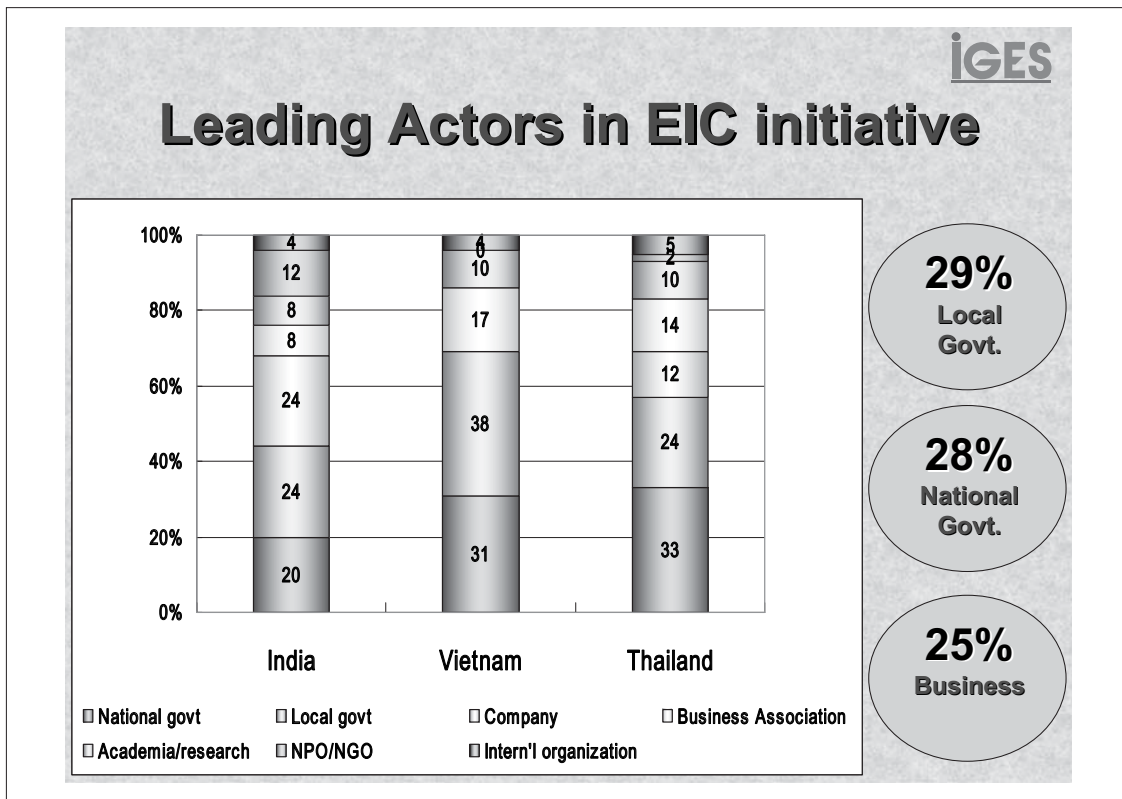
Slide 24



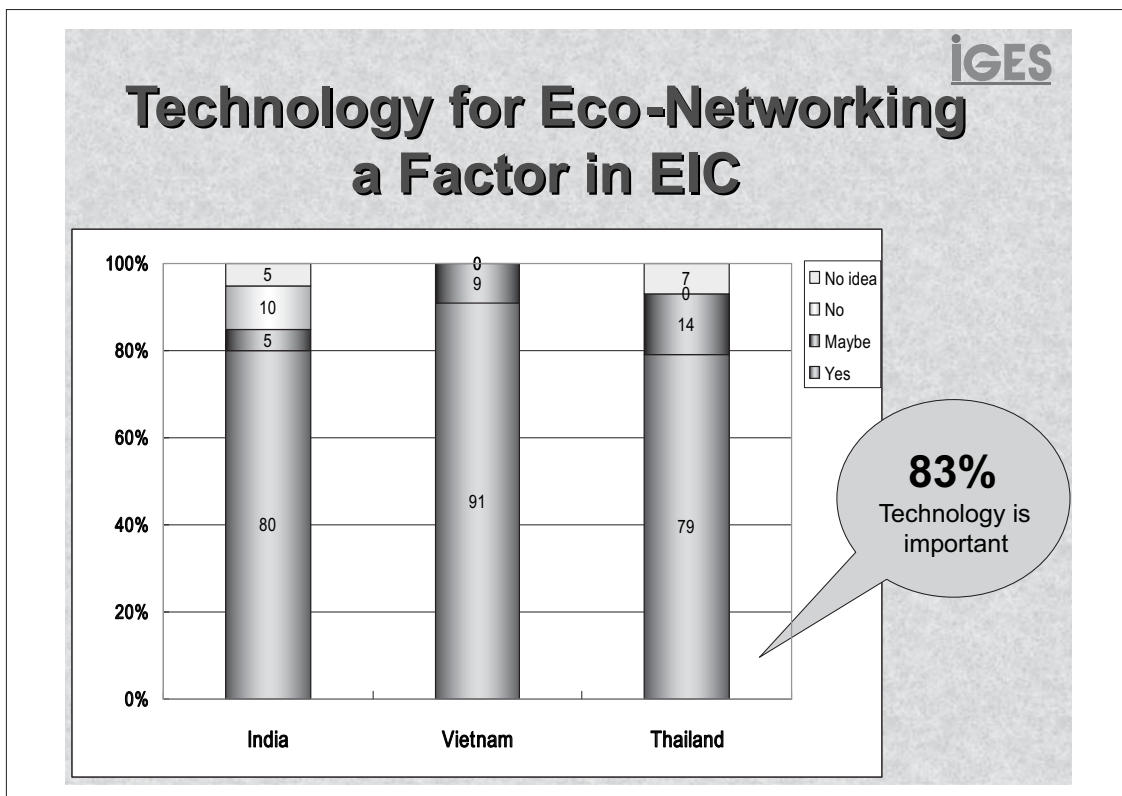
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Slide 27



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## Outcome from the Stakeholder Meetings

- Local industrial clusters are **located at the intersection of environment and economic development**. Development of well-functioning industrial cluster development in rural-urban areas is one of the essential steps in moving towards sustainable regional development
- **Inter-firm eco networks** shall be the main strategy to make the clusters as environmental friendly one.
- **Integrated policy guidance**, focused business leadership with clear objectives and good market orientation is essential for the success of such inter-firm networks.
- The potentials are high but eco-industrial cluster strategies may take long time to overshoot the mark because it has to be **accompanied by social capital creation**.
- Local industrial clusters are the better targets for rapid diffusion of best **environmental technologies/practices** because of their capacity and capability for coordination among firms.

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## Component 3

### Case Study Analysis




**SWOP – Strength, Weakness, Opportunities and Potentials of Functional EICs**


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# Case Study EIC Sites




**Maniwa**  
*Wood Industry*



**Chachoengsao**  
*Food Crop Industry*

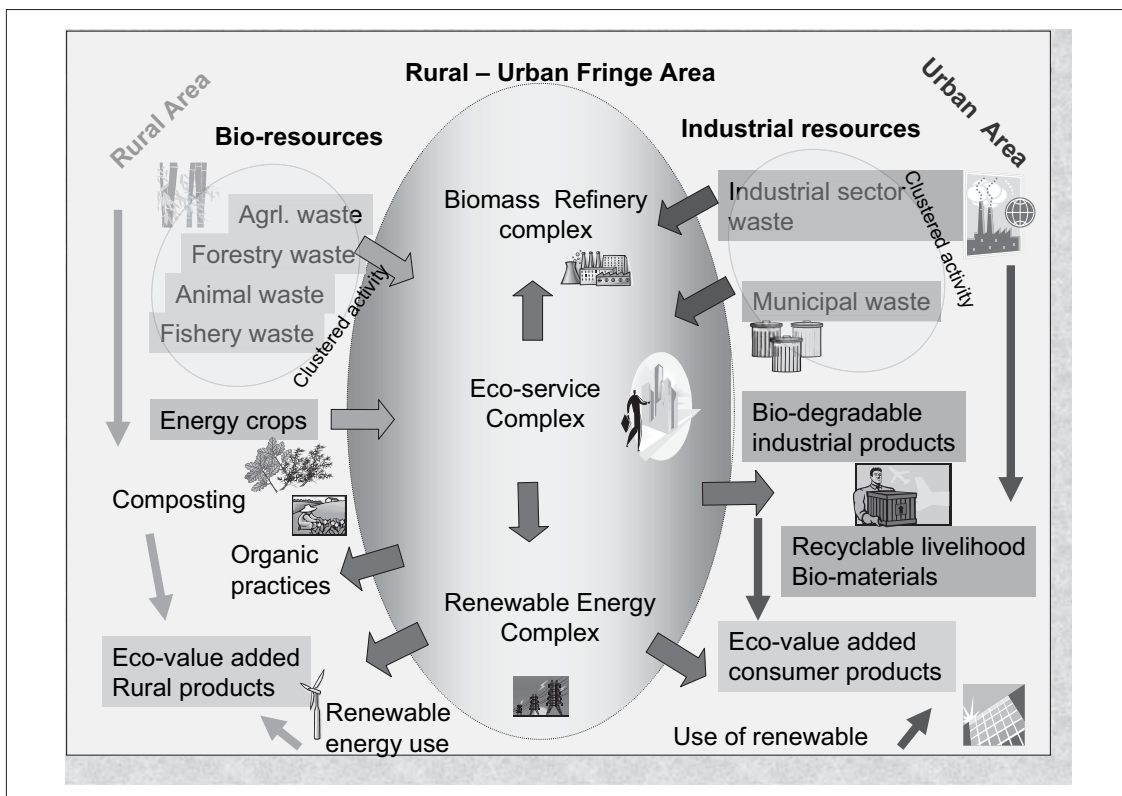


**An Giang**  
*Fish Industry*



**Hosur-Bangalore**  
*Sericulture industry*

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## EIC and Local Development

The strategy is built around the existing assets of the local community, namely resources, technology, business and people. By investing in these assets through integrated policies and linking them to the broader regional economy, innovative eco-cluster approaches not only strengthens environment, but also create economic opportunities for the localities. This is a promising way for disinvested, isolated regions to be connected to more vital national/international economy in a sustainable way.

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## Challenging the Facts

**Air Pollution In World Megacities**

Source: UNEP/WHO, 1992

**Regional Growth**

Nearly 50% of total manufacturing Shipments located around Tokyo & Osaka

million rural population without

Improved livelihood

28%


**Creates Pre-condition**

□ Asia ■ Africa □ Latin America ■ Europe

**EIC development in URF Areas**

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**We will be over 10 billion by 2050 in a much different living condition than what we have today**

**We need to produce enough goods and services in a sustainable way**

**Every individual, can participate in the process.  
Opportunities are there for everyone.**



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# **THANK YOU**

Special thanks to our partners at

- Maniwa Municipal Government, Okayama.
- Asian Institute of Technology, Bangkok, Thailand.
- Ho-chi Minh City University of Technology, HCMC, Viet Nam.
- Anna University, Chennai, India.



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