Study for Protection of Biodiversity on the Supply Chain

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Abstract—**The conceptualized relationship between humans and ecosystems/biodiversity that had until then been an ambiguous. Ecosystem services' are the benefits provided by ecosystems to humans, which contribute to making human life be rich and comfortable. In fact, quite extensive things such as, of course, our everyday lives, as well as others ranging from components of public services to commercial activity in the private sector, depend on ecosystem services. Some companies have taken the lead by implementing efforts according to frameworks developed around supply chains and business life cycles in order to obtain an overview of these relationships. Additionally, frameworks have been formulated to analyze each industries' impact and dependency on ecosystems, providing business insiders advance recognize of the macro-level relationship between business and ecosystem services. Certification systems meant to preserve biodiversity and conserve ecosystem services are a means to encourage ecosystem conservation in supply chains by utilizing market mechanisms, and products with certification labels based on these systems are being on sale. At present, common certification systems are mainly limited to primary industries such as forestry, fishery and agriculture. If the Life Cycle Assessment (LCA), an established environmental impact assessment method, can be applied to manufactured goods as well, then it would be possible to expand certification systems for them. Although this system will be able to contribute for environmental issue as well.**

Index Terms—**supply chain, biodiversity, protection, environment**

I. INTRODUCTION

Since then there has been a growing global interest in the problem of global warming and the general public has become aware of the importance of energy-saving and green initiatives. Biodiversity is one of related issue, but most of companies have been straggling to solve this problem. Meanwhile, it is also difficult to say that companies have a broad understanding of what they exactly should do to conserve biodiversity. In the case of combating global warming, "reducing greenhouse gases = reducing CO_2 = saving energy" is a relatively easy concept to understand. If the company takes action to conserve energy, then it will become its benefit by cutting costs. However, in many cases the company perceives no direct benefits, while targets of ecosystem conservation are connected with extensive human benefits. [1]-[11].

II. RELATIONSHIP OF SUPPLY CHAIN AND BIODIVERSITY

The reason why companies split into two groups who do and do not place importance on biodiversity conservation is likely a difference in how far each company recognizes the extent of their responsibility for their corporate behavior. As an example, a company in the middle of the supply chain shown in Fig. 1 that engages in "production, manufacturing, sales" often does not supply materials as upstream companies do or dispose of waste as downstream companies do. These tasks are usually performed by other companies in completely different industries. Such companies probably do not recognize a responsibility spanning the entire supply chain. Instead they would consider it the responsibility of other companies and industries that are directly connected to the ecosystem services corresponding to the upstream and downstream processes. This is why it is more difficult to feel the need for one's company to take action to conserve biodiversity and recognize that the company is connected to ecosystem services.
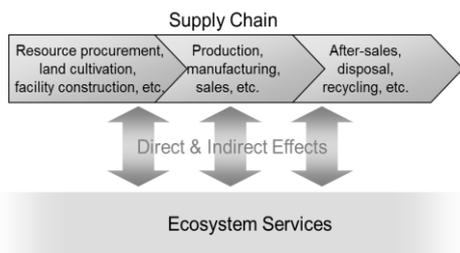
Figure 1. Relationship between business supply chains and ecosystem services

III. EXAMPLES OF RECENT ACTION BY COMPANY

A. Examples of Recent Action

The following methods have been established to assess the impact on nature by business activity.

Environmental impact assessments: LCA

Environmental performance assessments: LEED, CASBEE, etc.

Habitat assessments: HEP, JHEP, etc.

However, there is no exhaustive assessment approach anywhere in the world that can cover business activities in their entirety.

In March 2008, the World Business Council for Sustainable Development (WBCSD), the Meridian Institute, the World Resources Institute (WRI) and others published "The Corporate Ecosystem Services Review," which proposed the Ecosystem Services Review (ESR) as a way to approach assessments of the relationship between business activity and ecosystem services in terms of both dependence and impact.12 Since then, much corporate action today seeks to find solutions based on ESR frameworks [12].

B. Guidelines Encouraging Corporate Conservation

In April 2011, the WBCSD released, in the form of a report, the Corporate Ecosystem Valuation to further assess the relationship between business activities and ecosystem services, in order to promote ESR (as proposed in March 2008).15 The report provides detailed descriptions of the CEV method and steps to execute it. A notable point in the document is that the correlation, which is analyzed with dependency and impact of industry on ecosystem services for five industries, is indicated on a framework consisting of an industrial sector/ecosystem services matrix as shown in Table I. The correlation in Table I shows that all five industrial sectors depend on ecosystem services somewhat and have an impact on them. Considering that the matrix covers not just single businesses but entire supply chains, including upstream and downstream processes, it signifies that these interconnections appear between various corporate activities and ecosystem services. Green industries such as organic farming and ecotourism are industrial sectors that are particularly highly dependent upon ecosystem services. On the other hand, primary industries such as fishery, agriculture and forestry, and financial service industries such as banking and insurance, have an especially large impact on ecosystem services [13]-[25].

TABLE I.   ANALYSIS OF CORRELATION BETWEEN INDUSTRIAL SECTORS AND ECOSYSTEM SERVICES (FROM WBCSD-CEV)

Ecosystem Services (Excl. supporting services) (Examples)		Biodiversity dependent industries (fishing, agriculture, forestry)		Large "footprint" industries (mining, oil and gas, construction)		Manufacturing & processing (chemicals, ICT, consumer products)		"Green" enterprises (organic farming, ecotourism)		Financial services (banking, insurance & other financial intermediaries)	
		Depend	Impact	Depend	Impact	Depend	Impact	Depend	Impact	Depend	Impact
Provisioning Services	Food	●	●	○	●	●	●	●	○	●	●
	Timber & fibers	●	●	●	●	●	●	●	○	●	●
	Freshwater	●	●	●	●	●	●	●	○	●	●
	Genetic/ Pharmaceutical resources	●	●	○	○	●	●	●	○	●	●
Regulating Services	Climate & air quality regulation	●	●	●	●	●	●	●	○	●	●
	Water regulation & purification	●	●	●	●	●	●	●	○	●	●
	Pollination	●	●	–	○	○	○	●	●	●	●
	Natural hazard regulation	●	●	●	○	●	○	●	○	●	●
Cultural Services	Recreation & tourism	○	●	–	●	–	○	●	●	●	●
	Aesthetic/ non-use values	○	●	–	●	–	○	●	●	○	●
	Spiritual values	○	●	–	●	–	○	●	●	○	●

●: Moderate to Major relevance   ○: Minor relevance   –: Not relevant

C. Framework Example: Supply Chain-Based Impact Assessment Index

Fujitsu Limited is developing a framework to view the impact on ecosystem services based on its supply chain and products including land used for the business as shown in Fig. 2. The company identified the components that impact ecosystem services by using existing an environmental impact assessment method (LCA) and habitat assessment (HEP) to calculate the impact level, and formulated an integrated index for the entire Fujitsu Group. Since ICT is the Fujitsu Group's major business, ICT technologies into gathering, analyzing, evaluating, managing and monitoring the necessary data for biodiversity conservation is investigating to apply on the integrated index [24].

D. Corporate Promotion of Ecosystem Conservation in Global Supply Chains

British-Dutch Company Unilever, which sells a vast array of foods, detergents and other daily necessities across the globe, announced a vision to "double the size of our business while reducing our overall environmental impact across our entire value chain." The company is proactively developing a biodiversity conservation certification system to promote ecosystem conservation through Unilever's main products.16 Many of the products the company handles are dependent upon ecosystem services, and one of its defining characteristics in particular is that many of its raw materials are supplied by agriculture [25].

IV. CERTIFICATION SYSTEMS TO PROMOTE ECOSYSTEM CONSERVATION IN SUPPLY CHAINS

A. Distribution of Ecosystem-Friendly Certified Products

As explained by the examples as previous section, distribution of certified products is an effective means to promote ecosystem conservation in global supply chains by utilizing market mechanisms as shown in Fig. 2. This approach is based on the products with certification label qualified by conservation activities for biodiversity and ecosystems, and is also utilized as part of a company's marketing or corporate social responsibility (CSR). Fig. 2 is the case applied with a particularly strong connection to ecosystem services in the upstream processes from Fig.1. In current certification systems, method of ecosystem conservation implemented when delivering resources in upstream processes is general.
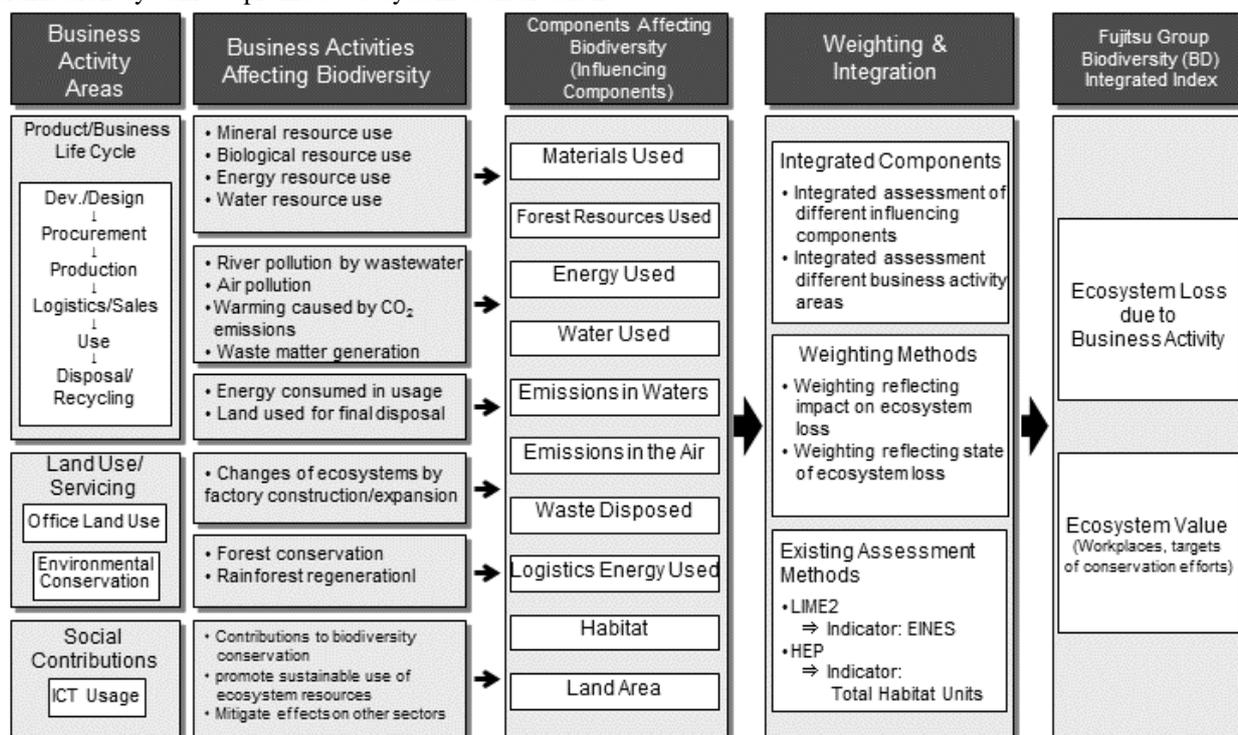

Figure 2. Example of FUJITSU group framework

The basic concepts of a certification system are as below.

1. Certification labels are given for ecosystem-friendly products that are qualified with an assessment/certification by an examining authority to judge whether the products meet criteria prescribed by a third-party certification body.
2. Consumers understand that a certification label shows that a product is good for the environment or ecosystems and selectively purchase certified products.
3. Expanding sales volume of products encourages ecosystem conservation relevant to ecosystem service functions.

Furthermore, since certified products also provide traceability from upstream to the downstream processes,

they have been regarded as safer products recently, thus their added value is increasing.
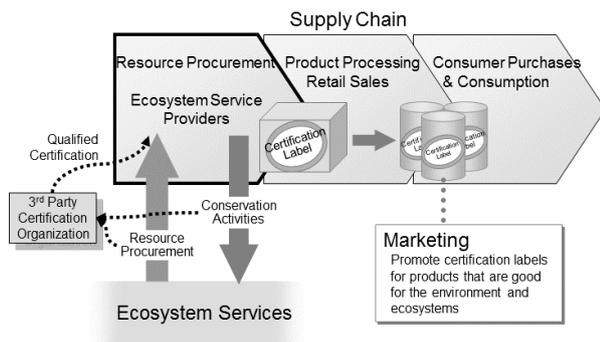

Figure 3.   Market Mechanism-based ecosystem conservation methods

This is how international certification systems in the forestry, fishing and agriculture industries have spread and become models for others. .These systems will likely expand further to new regions, countries and economic zone. However, internationally uniformed certification standards do not necessarily suit the conditions and customs in every country. Certification systems require globalization to follow international certification criteria that make up the de facto standard while adapting to the circumstances of each country.

Meanwhile, we must avoid creating excessive kinds of certification labels so that consumers will not confuse.

V.   CONCLUSIONS

Manufactured product seems to be typical area where certification systems have not advanced yet regardless of the widespread use. There are various stages in the lifecycle of an industrial product that affect the environment in many ways: material mining/delivery (upstream processes), production, sales and disposal (downstream processes). The Life Cycle Assessment (LCA), an environmental impact assessment method developed to quantitatively and objectively calculate future environmental impact, is a general-purpose tool that is also an international standard as ISO 14040-14043. One can use this method to calculate things such as utilization efficiency of energy, resources and materials and the impact of substances released over the entire life cycle into the atmosphere, water and soil. It can also be used to acquire a product's environmental impact certification from a third-party organization.

Another thing is that ecosystem conservation certification labels correspond to traceability requirements for more secure society. An advanced global market model in regions and economic zone actively embraced certification systems, is the image of future vigorous society. In the service industry sectors with high added value including manufactures that are Japan's advantage, encouraging certification distribution

leads to realize next-generation environmentally-friendly market mechanisms. It is expected that companies that have not addressed the relevance of ecosystems much before, as well as government agencies, take actions and efforts forward-looking as described in this paper.

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