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While there was a serious concern that the expansion of trade and investment may lead to environmental degradation, most previous studies have indicated that an increase in trade would actually improve environmental conditions. This study aims to analyse the effects of trade and investment on the environment, particularly focusing on the main causes by which trade and investment affects the environment when income levels are equal. The explanatory variables include, sulphur dioxide (SO_2) emissions as the dependent variable, the ratio of manufacturing imports to GDP, the ratio of energy trade to total primary energy supply (TPES) and the ratios of total trade and foreign direct investment (FDI) to GDP. The results support the assumption that the expansion of trade would benefit the environment when income levels are equal. However, the effects of the spread of cleaner technology, which was considered to be one of the main causes of the so-called technique effect, as well as the effect of FDI were not clearly observed.

This paper analyzes the development of coalitions of state-actors and their behavior during the development of new schemes for environmental impact assessment on carbon capture and storage under the sub-seabed (hereafter, “CCS”). This paper deals the coalition development and interplay of two regimes of CCS, specifically focusing on the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 29 December 1972 and the Convention for the Protection of the Marine Environment of the North-East Atlantic. The two regimes have almost same legal texts and framework of administrative instructions on implementation, which make the institutional linkage and interplay in the context of CCS. The coalition was expanded through the accumulation of discussion of both of legal and technical aspects of CCS. In these cases, the parties which supported the amendment of legal texts of two regimes found profit by mutual support and understanding of the situation brought by members in the coalition. The opposite parties without coalition did not counter the proposal on CCS issues and could not increase the support of other parties, which were defeated by voting on the amendment of protocol.

To assess changes in the soil salinity status of agricultural farmlands devastated by the 2011 Tohoku-oki tsunami in Miyagi prefecture, soil samples were collected from different types of farmlands in 2013 and analyzed. The sampling included reclaimed and nonreclaimed lowland (paddy fields) and upland areas in Kesennuma shi, Minamisanriku cho, and Watari cho. The results revealed that the soil salinity of most of the farmlands returned to a normal level (electrical conductivity [EC] value within 0.3 to 0.6 dS m^{-1}) under natural condition, mainly due to abundant annual precipitation in the years after the tsunami. Remedial works have further accelerated the soil recovery at these sites, and it is now almost close to the pretsunami levels. We recommend that proper remediation in agricultural lands would be accomplished through a combination of mechanical remediation and site-specific agronomic management strategies in the study area.

Nagano City in Nagano Prefecture, Japan, is an environmentally advanced municipality. This study examines the relationship between the change of the residents' degree of acquisition of environmental information before and after the Great East Japan Earthquake and the residents' degree of formation of environmental consciousness concerning an energy problem by means of a survey conducted by questionnaire. The results show that for the person in whom the degree of acquisition of environmental

information increased after the earthquake the degree of acquisition of environmental information before the earthquake was low and after the earthquake was high in comparison with the person in whom the degree of acquisition of environmental information didn't increase. And the degree of acquisition of environmental information contributed to the residents' degree of formation of environmental consciousness concerning an energy problem. It is thought that, as for the person whom the degree of acquisition of environmental information increased after the earthquake, the degree of acquisition of environmental information might increase in a short time after the earthquake.

Prior research suggested that principal component analysis was effective as an alternative assessment technique in terms of clarity of reasons for selecting the most suitable option, low arbitrariness, verification of analysis results and easiness of technique. This study aimed to apply this analysis to the 15 cases of alternative assessment that the Japan International Cooperation Agency prepared, in order to verify the adequacy of a regular assessment methodology. Some options selected were the same as options selected by regular techniques and other options were different. The reasons would be criteria setting with a high correlation, arbitrary weighting and evaluation, and summation using scores not normalized. The principal component analysis could deal with the above-mentioned problems and be a recommended alternative assessment technique and a preferable number of alternatives and criteria could be six and ten at the minimum. Finally, this paper proposed to use this analysis as a second assessment technique to verify the result of an alternative analysis with summation using normalized scores. Further case studies are required to find an appropriate alternative assessment methodology including public involvement and establishing correct criteria and right alternatives.

Residential energy consumption has been estimated using statistics about activity schedules. Typical activity schedule-generation methods use only the National Time Use Survey (NHK survey) and have been used in estimations of residential energy consumption. However, activity schedule-generation methods using only the NHK survey have problems. Method for generating activity schedules by integrating multiple statistics using data fusion improves these problems. But it is not clear how improving the accuracy of residential energy consumption estimation through this method compares to that using only the NHK survey. This study reveals the degree of improvement seen in the estimation accuracy of residential energy consumption by this method. As a result, it is shown that the estimation accuracy of residential energy consumption by NHK + PT+TU is higher than by NHK only.

Scarcity of resources and increasing environmental issues has caused the Chinese government to stipulate stricter environmental regulations or offer innovative programs to address these issues. Green supply chain management (GSCM) is one of the solutions for environmental management. The purpose of GSCM implementation into business activities is to concurrently improve environmental and economic performance. This study aimed to examine the influential factors of GSCM in the Chinese construction industry among twelve criteria for three main GSCM practices, namely practices, performance and pressure. The questionnaire survey related to these twelve criteria was carried out for 4 manufacturers. The decision-making trial and evaluation laboratory (DEMATEL) method was used to form a structural model to find out the cause and effect relationships among criteria. By identifying the structures and interrelationships, it could offer insights for decision makers for understanding cause-effect relationships and allow improving both economic and environmental performance. Conclusions were drawn from the survey.

Bamboo is an important natural resource in China. Bamboo forest damage causes a serious threat to the natural environment and can lead to economic losses. Satellite images are useful for understanding forest damage. However, there is limited forest monitoring with satellite data used to assess bamboo forest damage. In this study for assessing bamboo forest damage in Fujian, China, we utilized five Landsat TM scenes collected from 1988 to 2009, the supervised classification method that was first applied to

distinguish the bamboo forest from the other forest types based on the field survey data. From the comparison of spectral profiles of healthy bamboo and damaged bamboo in October, the second band of the Tasseled Cap Transformation ("greenness") was selected to estimate the degree of damage of the bamboo forest. This study demonstrates the effectiveness of using the Landsat TM data for monitoring bamboo forest changes, and the results suggest that there is potential for extracting the damaged bamboo portions and estimating the degree of damage to the abnormal bamboo parts using the Tasseled Cap Transformation "greenness" band.

Study on the Selection of Actinomycete Suitable to the Treatment of Highly-concentrated Effluent and Processing Property of Inclusive Immobilization Method 59

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This study shows that actinomycete was separated from soil in order to treat concentrated wastewater by no dilution, and effective strains were identified based on the comparison of proliferating and metabolizing ability. Moreover, it was found that the treatment capacity of concentrated wastewater by an immobilized carrier which contained the effective strain of sodium alginate-acrylamide resulted in a decrease in foaming. In addition, there was an improvement in the efficiency of solid-liquid separation and in the treatment of wastewater by the condensation of the strain. As a result of isolation culture, twenty-six separated strains were obtained in the soil sampling. It was found that isolation strain 07A1 was an effective strain suitable for concentrated wastewater treatment. It was accepted that the treatment capacity of concentrated wastewater by the strain 07A1. It was confirmed that oxygen consumption increased with the treatment of the concentrated wastewater. The result of a measurement of the DO profile in the carrier showed that there was not DO in the 2.0mm inside the carrier surface. From this, it can be said that the suitable diameter of carrier is less than 0.4mm.

Allelopathic Effect of the Cyanobacterium *Microcystis aeruginosa* and the Diatom *Cyclotella* sp. on Interspecific Algal Competition 65

Yoshimasa AMANO, Satomi SEKI, Motoi MACHIDA and Fumio IMAZEKI

This study examined a possibility of the allelopathic interaction in the interspecific algal competition between the cyanobacterium *Microcystis aeruginosa* and the diatom *Cyclotella* sp. through a monoculture experiment at 20ºC assuming spring and/or early summer period. The growth characteristics of *M. aeruginosa* and *Cyclotella* sp. were investigated using culture medium of each species obtained in different growth phases to reveal the intensity of their allelopathic sucstances, and a possibility of the dominant species transition from *M. aeruginosa* to *Cyclotella* sp. was discussed from a viewpoint of the allelopathic effect. The results showed that the allelopathic effect was varied depending on the growth phase of *M. aeruginosa* and *Cyclotella* sp. The allelopathic substances produced by *M. aeruginosa* in the stationary growth phase caused a positive effect for *Cyclotella* sp. leading to the growth promotion, while a negative effect by *Cyclotella* sp. was found for *M. aeruginosa*. The growth promotion of *Cyclotella* sp., which plays an important role for the dominant species transition from *M. aeruginosa* to *Cyclotella* sp., could be one of the ways to inhibit cyanobacterial blooms implying that creating the diatoms rich condition is important to control of cyanobacterial blooms.

Regional Impact by Business Creation of High value-added Products from Woody Biomass with Case Study in Maniwa, Japan 73

Dami MOON and Yutaka GENCHI

The purpose of this study is to compare regional impacts of woody biomass utilization between for wood chip for fuel (WC) and high value-added products called Master batch of Cellulose Nanofiber (MB) in Maniwa, Japan. Concretely, we examined the impact of regional economic structure, the employment opportunities by means of Input-Output (I/O) model, and amount of Greenhouse Gas emissions was also estimated using 3-EID data and the result of I/O analysis. For this study, three different situations were described: WC scenario, MB scenario, and Business as usual (BAU) scenario. As a result, demand and supply structure in the economy of Maniwa has changed relatively little in WC scenario compared to MB scenario. And, 103 employed people can be increased through the implementation of MB scenario, while only 7 employed people can be generated under the WC scenario. Under the MB scenario, gross demands per a GHG emission were decreased by 0.23%, whereas the WC scenario was increased by 0.1% compared to BAU scenario. On the basis of results, in-depth analysis for effective utilization of woody biomass toward economically and environmentally sound development in rural regions is needed and we will leave it as a future task.

Horse logging is currently used in a limited area in Japan, and this traditional practice and its environmental effects are currently being reevaluated. Here, we used four case studies to analyze the characteristics of working sites and the transportation conditions involved in typical horse-logging practices. Our analyses yielded the following insights: as horse logging is used mainly to avoid constructing new forestry or spur roads, destruction of forested land, time, and cost are minimized; horses can navigate through narrower spaces than forestry machinery, but to conduct horse logging efficiently, partial construction of short spur roads or tentative roads is sometimes necessary; the number of felled trees is small when qualitative thinning, small-scale clear cutting, and selective cutting are conducted, and hauling logs using horses may be more efficient than using vehicles or machinery.

This study investigated users' preferences concerning resting places in urban green spaces. An experiment was performed with 20 participants; it focused on users' psychological criteria for utilization and satisfaction with regard to resting places in two urban green spaces. In terms of choice behavior, participants set a high value on "avoiding congestion and being in a discreet place," "richness of plants," and "good atmosphere." In addition, participants' inclination toward choice behavior was classified into three groups: "sunny environment type," "access type," and "marginal environment type." The most favorable resting place was different before and after resting and was not always identical between relative and absolute evaluation. Furthermore, despite no significant difference in the favorable ratings of resting places across the study areas, significant differences were observed if we arranged the data of the three study areas into three groups along the order of preference in each case. To demonstrate the users' preference criteria, we compared them with new data from these three groups. The results indicate that "sense of security" and "spacious" were the users' preference criteria. Furthermore, the elements that correlated with the favorable rating of the resting place were primarily "richness of plants" and "clarity."

Most of our daily therapeutic experiences from plants are visual experiences, which can be evidenced by the introduction of imitation plants to our residential or business spaces. Some previous studies have reported that even imitation plants are able to give people a good impression. Using an evaluation profile of the subjects' impressions, this study, in which the experimental subjects can touch and see plants, compares the visual experience of seeing plants with the tactile experience. The subjects were 29 students (14 male and 15 female) aged from 21 to 27 (mean ± sd: 22.7 ± 2.2). The subjects observed at four different experimental samples including natural leaves, and then touched each sample with their eyes open. After each stimuli (i.e. visual and tactile stimuli), a semantic differential method was used, and a trait anxiety test was also conducted. Significant differences between a genuine and an imitation pothos leaf were observed in the tactile properties for 'Smooth–Rough' and 'Soft–Hard', but were not seen in the affective adjectives such as 'Pleasant–Unpleasant' or 'Like–Dislike' through visual stimuli. However, by adding the tactile stimuli, significant differences were seen in the affective adjectives. This study suggests that judgments based on visual stimuli are cognitive and judgments based on tactile stimuli are affective, and that touching natural leaves is preferred to touching imitation leaves.

Japan launched a Feed-in Tariff (FiT) system in July 2012, and the Act on the Promotion of Renewable Energy in Rural Areas came into force in May 2014. This legislation aims to breathe new life into rural communities through the deployment of renewable energy generation plants . Such communities face structural problems including increasingly aged populations, shortage of successors, and price competition stemming from globalization, and abandoned farmland accounted for over 10% of the total area of farmland in Japan in 2010. From the launch of the FiT system up to March 2014, a total renewable energy generation capacity of 68.641 million kW was installed, with photovoltaic energy generation accounting for 95.8% of this total, accompanied by a rapid increase in farmland conversions. In the case of Wakayama Prefecture, 112 permits for farmland conversion were granted for the purpose of power generation in the 24 months after the launch of the FiT system. Citizen-funded and other local community-based renewable energy generation projects have been launched nationwide, but the deployment of photovoltaic power plants on farmland has brought even more dramatic change to local communities, as the FiT system provided an

immediately effective means of generating profit. Conversion of farmland to photovoltaic power plants under the FiT system may boost farmer income, but this boom can hardly be described as contributing to the sound development of Japan's agriculture and forestry sector.

The study of the psychological evaluation of the landscape was begun in the 1960s, and has become popular in many countries and is curently progressing. In this paper, I examined the researches which have been published in major English-language journals, e.g. Landscape and Urban Planning, Landscape Research, Environmental Management, Environment and Behavior, Environmental Psychology and others until 2013. Based on the process of the phenomenon of landscape experiences and appreciation, this historical review was divided into 5 parts. They are (1) understandings of landscape appreciation, (2) attributes of respondents, i. e. the observers, (3) appreciations of landscape, i.e. the items of psychological evaluations, (4) focal objects in the landscape and their observation methods, and (5) analytical methods and their results for planning proposals. In this paper, I have discussed parts of (1) to (3) and parts of (4) to (5) will be discussed in a subsequent paper.

This research aims to estimate the environmental impact of wind turbine power plants on nearby communities during operation and the attitude of the hosting community towards future wind turbines by reviewing information on construction procedures. The procedure for gaining permission for a wind turbine power plant is divided into three main phases, but approval does not require preparing an environmental impact assessment report for review in order to obtain the required licenses. Instead, only the opinions of nearby communities, collected through public hearings in the project area, are used. In this study, we consider how after the project is completed and commences operations, these nearby communities are affected by the wind turbine array. We thus analyze data from a field survey of nearby communities and interviews with leaders and community members, including those living in the area for over 10 years, regarding various environmental, social, and quality of life factors. We consider water quality, air quality, noise pollution, increased shade, land utilization, economic impacts, and visual pollution. Focusing on the negative impacts, we show that the nearby communities see noise pollution as the greatest environmental impact of the wind turbines, followed by overshadowing and visual pollution. The community's attitudes towards future wind turbine power plants are mixed. Community members also express a desire for the government to consider the actual environmental impact of wind turbine power plants after operation.

This study's purpose is to examine the Means of Implementation (MOI) used by Japanese Local Agenda 21 (LA21), to contribute to the future implementation of Sustainable Development Goals (SDGs). Although the MOI consists of a diverse range of mechanisms, this study focuses on financial resouces, communication technology, and multi-stakeholder partnerships. A case study methodology using Miyako Agenda 21 Forum and Toyonaka Agenda 21 found that the financial resources for both endeavors rely primarily on public finances; however, the former, the Miyako Agenda 21 Forum, has unique and innovative features, continuously creating self-supported organizations for confronting a lack of funding. It was also noted that with regard to communications technology, it is important to enhance conventional methods by using public relations magazines as well as by aiming at younger people to increase membership. With regard to multi-stakeholder partnerships, it was observed that municipality leadership and the high level of stakeholder engagement are prominent in both organizations. In addition, multi- layered networking was observed in implementation. To promote practical and constructive approaches, it is important to share accumulated experiences and knowledge on the future implementation of such efforts.