

## **H-10 Study on System Design and Measures of Social, Economic, and Environmental Cooperation between Urban and Rural Regions (2002-2004)**

**Contact person** Masaharu Osawa  
Professor, Faculty of Economics  
Aichi University  
Machihata 1-1, Toyohashi, Japan  
Tel:+81-532-47-4111 Fax:+81-532-47-4197  
E-mail:osawa@vega.aichi-u.ac.jp

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### 1. Introduction

As efforts to deal with environmental problems, technological measures for reducing environmental loads themselves are important. At the same time it is important, for the purpose of enhancing the effectiveness of environmental measures, to consider the sideline aspects of the environment and human beings, society, and economic actions, and system frameworks from the viewpoint of the balance of the environment and economy, to set the scopes of scale for optimal regional space and time space, and to incorporate daily diffusion and smooth management regarding the repercussion continuity of the environment in the economic and social systems of human beings.

In this research, environmental issues and their countermeasures are grasped as mentioned above, while the extensive space of continual urban and rural areas are selected as research targets. Thus, global-scale environmental measures will be pursued, based on combination with regional-scale environmental countermeasures.

This research, designed to focus on regions, has the character of meeting present-day requirements for correcting the imbalance of regional economy and promoting the dispersion of rights to local areas. Simultaneously, it features directly leading to the solution of such structural problems as urban concentration, excessive depopulation of local areas, and rehabilitation of agriculture.

### 2. Research Objective

Regarding this research, its ultimate objective is to strive for the simultaneous solution of regional-scale and global-scale environmental problems based on the effects of the environmental issue solution of the global scale, to be sought from the wide urban-rural regions.

Further, this research has added “the application of the extensive urban-rural area

collaboration toward developing countries” to the objective, because the application can be expected to become a new course contributing to the settlement of excessive urban concentration problems in many developing countries.

### 3. Content and Result

#### (1) Current State in the Urban-Rural Region

In proceeding with the study of these research themes, we analyzed problems inherent in our country and the current situation of the regional space in the urban and rural regions, while using cases in Japan and abroad for reference. We also confirmed the efficiency of the regional space setting of cities and farming villages, while putting future environmental efforts in mind.

In this country, meanwhile, the movement toward the de-concentration of power is being activated. For the realization of de-concentration of power, merger of cities/towns/villages is progressing, while discussion in favor of adopting the system of wider districts than Prefectures (Do-shu system) and local governments is gaining ground. Realized or advocated cases include those of joining or tie-ups of social economies between cities and rural areas, promoted from geological or functional viewpoints.

Furthermore, Japan’s policy regarding agriculture was drastically altered from one based on the Agricultural Basic Law, which sought establishment of a balance among prices, production, and structure, to another backed by the Food, Agriculture, and Farming Village Basic Law (enacted in 1999), which is represented by a philosophy that pushes for continued development of agriculture through the realization of stabilized supply of foods, farming village promotion, and maintenance and development of multilateral functions.

In particular, measures for non-tilled farmland and forests lacking in management pose important tasks in Japanese agricultural and forestry administration, and in this respect, solution is based on coordination with environmental and energy policies through planting/growing of energy-related plants, use of biomass, etc.

To establish effectiveness of environmental measures for the future, based on the aforementioned research and analysis of urban and rural districts, as well as agriculture, it will become important to clarify the functions of cities and farming villages as well as their responsibilities, and also to seek optimization and operational rationalization of not only environment but also goods, money, and people and the flow of information, based on the structure of economy and society. For detailed study of the real state of wide urban and rural region in the current research, therefore, this researcher selected the San-En-Nanshin District, which covers Mikawa (Aichi Prefecture), Enshu (Shizuoka Prefecture), and South Shinshu (Nagano Prefecture), as the region for the case study. The reason for the selection of the district is that it is a wide region consisting in excellent balance of cities -- Toyohashi, Hamamatsu, and Iida – which have their inherent urban functions and farming villages and mountainous village space surrounded by these cities. In addition, this wide region has an agricultural areas in Atsumi Peninsula and the Enshu area, whose farming raw productivity is

one of the highest in Japan.

## (2) Buildup of an Urban and Rural Linkage Model and Simulation Analysis

While clarifying the relationship between environmental loads and economic recycling, this researcher and his group constructed an Urban and Rural Linkage Model that highlights circulation of physical goods, and based on policy simulation that used this Model, we sought the desired shape of policy mix designed to attain the optimal linkage between cities and farming villages. In these efforts, we considered it possible to realize the most optimal distribution of environmental loads in wide regions by managing land utilization and material circulation in arteries ranging from production to consumption, and in post-consumption veins. We also presumed that, through the execution of policy mix related to these, it will become possible to reduce environmental loads, which cannot be achieved through measures in limited individual areas.

This Model particularly focuses on the recycling of organic waste, which is interlocked with the economy and employment movements between cities and rural areas; the distribution of environmental loads in wide regional space, which includes effects of forests in absorbing carbon dioxide, and related conditions of these environmental loads, in consideration of urban and rural linkage. Based on this approach, the Model includes an appropriate space layout designed to enhance the efficiency of environmental measures, based on the transfer of organic waste, and optimization of transport patterns, as its central elements. Further, this Model adopts reduction of carbon dioxide discharge and maximization of positive social surplus as its target function. Combination of environmental measures, addressed from this viewpoint, and conventional individual environmental countermeasures, will surely lead to reduction of environmental loads.

Through use of this Model, it is specifically possible to study (1) social effects of biomass, (2) changes in land utilization (we paid particular attention to decision-making on ways to utilize untilld farmland), (3) alterations in traffic conditions, and (4) effects of environmental policies, including environmental tax. In particular, appropriate and planning-based land utilization and location will surely lead to drastic reduction of transport volume and decrease of environmental loads, which are greatly important. This being the case, use of the Model as a basic tool in future regional planning is ardently awaited. In addition, regarding local load systems, which have so far been evaluated based on the used transport volume, the significance of their existence is feared to be rated excessively low, all the more because the current state is inconvenient. Based on this Model, however, effects of improvement in traffic conditions in the entire region can be clarified, and therefore, the Model will contribute toward optimization of traffic plans in years to come. Moreover, it will become possible to quantitatively grasp changes in the broad regional economy through the combination of environmental measures, so that the Model can also be termed effective in policy evaluation in the realm of the environment. In dealing with the effects of environment tax, for instance, its effects can be analyzed when we only change the parameters of expenses for the discharge of carbon dioxide.

Regarding simulation using this Urban and Rural Linkage Model, this researcher carried it out on the San-En-Nanshin District. The purpose of the simulation was to obtain the maximization of social surplus by studying how to utilize untitled farmland through land utilization policy. Through analysis of three cases of land use conversion (economy prioritized type, environment harmonization type, and the balance type), we implemented a quantitative comparison between the effects of environmental tax imposition and social surplus. We also quantitatively grasped the environmental load reduction effects resulting from the operation of biomass plants, to be located through the conversion of land use, and new forest management stemming from the policy effects of environmental tax introduction. Because transport expenses required for production activities are minimized in line with the maximization of social surplus, we evaluated the physical distribution systems in the wide regional space by means of the inner-region transport volume.

Based on the results of the simulation, we executed trial calculation of the relationship between social surplus and CO<sub>2</sub> reduction. Thus, we showed the possibility of simultaneous advancement in the economy and environmental conservation.

### (3) Policy mix for the reduction of environmental loads based on urban and rural linkage

Conventionally, land utilization policy tends to individually maximize various functions of cities and farming villages. Seen from the angle of broad regional space, the conventional land utilization policy is liable to give rise to an imbalance of the economy and environmental measures. As a result, it sometimes provided negative effects to the entire broad regions, adversely affecting social foundations of the region or relationships between people.

The Urban and Rural Linkage Model, based on this research, indicates the direction toward the correction of such a state of land utilization policy. To implement global-scale environmental measures, it is important not to simply collect the effects of individual areas but to consider the total effects of such measures while giving thought to the balance of 3E (economy, environment, and energy).

What we should keep in mind is the policy selection to realize the charts indicated by the Urban and Rural Linkage Model for a long range of time. The points requiring particular attention in this thinking are to adjust mutual relations of effects caused by multiple policies in various existent fields, from the viewpoints of replaceability and competitiveness, and to implement short- and long-term adjustment based on the time axis. The Urban and Rural Linkage Model in the present research is effective for executing the former adjustment, but further research is considered necessary to discern the direction of the latter adjustment.

When considering policy mix based on the Urban and Rural Linkage Model, the degree of priority for policies to be selected is different for inherency of the region concerned. In the case of the San-En-Nanshin District, the weight of agriculture and forestry is great, such that it is considered proper to put priority on policy to promote natural recycling, namely recycling of organic waste, including agricultural/forestry waste, among others, and to utilize forestry functions.

Further, it is believed possible for various environments surrounding the policy not to progress as suggested by the charts shown. Adjustment related to such uncertainty, related to this policy execution, will become necessary. Uncertainty is sometimes due to external factors. Accordingly, policy consisting of preventive measures to prepare against untoward events and risk dispersion measures will be important. However, there is uncertainty that can be avoided. If we consider this point, it is believed important to adopt policy that is flexible enough regarding public acceptance; that is, whether or not the policy itself can be accepted by people, as well as information control, disclosure, and environmental changes. Considering further that various policies will be intermingled, it is required to attach importance to distribution of information, and to improve the monitoring and referee functions through the use of a third-party organization, for instance, and to ensure adjustment of interest among the parties concerned and fairness in handling of the matter.

In addition, considerations necessary in selecting policies within broad regional areas are to maintain the balance within the region; to avoid closed handling; to maintain openness to the outside, and to keep balance between the inside and outside. To maintain the balance without the wide space, distribution that keeps flow within the region going, the policies related to the internal structure of the region, and the positioning within the region, will assume greater importance. In connection with distribution, not only the flow handled in the Urban and Rural Linkage Model but also the flow of culture and information will also become important. As for internal structure, it is significant to clarify the rights, obligations, and responsibilities of structural members as a premise. It is certain that the collection and use of environment tax, which is an indirect means, and transactions of emission rights, are powerful menus to reduce environment loads for the entire region, but if these measures are to display their intended effects, clear recognition of related rights, obligations, and responsibilities is essential. As effective forms of internal structures, club organizations and NPO organizations may prove effective, while as a means to smoothen inter-organizational relations, eco-money may turn out to be an effective menu.

The method for clarifying responsibilities in wide regional space is not necessarily limited to seeking an ownership approach designed to adjust rights thoroughly. Utilizing cooperatives, establishing common rules, and setting rules for sanctuaries not belonging to any party may, if seen from the other side, contribute to clarification of rights. Important policies are considered to be setting of a gray zone between cities and rural villages, and using the zone for joint functions and purposes.

Finally, this researcher and his group would like to point out that necessary elements as the premise for such a policy mix are to solidify the foundations of society through basic environmental measures involving education and distribution of information; to establish “collaboration” while striving for the freedom and stability of people, communities, and culture; to introduce the principle of market competition while thinking over the new role of the public sector; to establish “efficiency”; and to ensure “fairness,” which is essential for the continuation of society

#### (4) Contribution to Countermeasures toward Problems of Urban Pollution in Developing Countries

This research has its significance in its asking about the applicability of the policy, based on the San-En-Nanshin District, to the regions where the wide regional urban and rural tie-up is being constructed amid such de-concentration.

For such case study, we decided to take up the JABODETABEK wide region (Jabodetabek region near Jakarta, Indonesia, and Depok, an adjacent city), implemented detailed status examination, and started the application of the model.

The research target region – JABODETABEK, may be termed a forerunning example of forming a wide region in Indonesia. It is true, however, that its formation was inaugurated even before the start of de-concentrating process, and it is not necessarily based on sustainability or the urban-rural tie-up. In fact, a dispute has arisen between Jakarta and Bekasi, since the municipality of Jakarta tried to treat, in Bekasi, waste that was originally produced in Jakarta.

As a result of our collection and analysis of basic data, it is possible to conclude that de-concentration of power in Indonesia has caused only negative effects of expanding pollution, so far as the environmental problems are concerned. Specifically, population growth has begun shifting from urban areas to outskirts of cities, and agriculture which has the role of commercializing agricultural products is in confusion, while the construction/improvement of infrastructure and systems for waste disposal are required urgently, and it is necessary to construct peripheral transport networks and to take congestion relaxation measures. While these problems are revealed, it has become clear again that the volume shortage of data and the lack of their reliability are serious. Regarding the application of the San-En-Nanshin Model to Jabodetabek, study will be made in parallel with self-measurement of data in the future.

Regarding de-concentration of power in Indonesia, many of preceding research focused on the relationship with the central government in terms of power and systems for financial independence. This research from such viewpoints: what is the administration of local areas having good characteristics, and what roles should be played by local areas in the context of post-centralized development principle, obtained the evaluation that it is greatly timely for the display of its real merits, in Indonesia. In particular, interest in the buildup of an Indonesian-version model, model analysis, and the recycling-type society has increased in research targets, such as various Indonesian Government agencies and universities, as a result of our research.

If effectiveness of an urban-rural tie-up model is confirmed, and if the understanding of the concepts is commonly owned by peoples of developed and developing countries, a vision for new international environment cooperation, focusing on the formation of sustainable society systems, will emerge, replacing the so-called international environment cooperation of the technological principle type, which uses the cities of Yokkaichi and Kita Kyushu as models.

#### 4. Consideration

In Japan, the need for urban and rural linkage has increased from the viewpoints of movement toward de-concentration of power, technology, and environmental measures. To grasp measures against global warming at this wide regional level is considered to be at good timing. As global-scale greenhouse-effect gas countermeasures, these supposedly represent a new approach that can be incorporated into society while seeking economy of scale. Further, the global environment issue and the local area promotion problem can be solved synergistically with the regional environmental issues.

The Urban and Rural Linkage Model developed in this research gives particular consideration to the collaboration between cities and rural villages. With consciousness placed especially on the distribution of environmental loads in wide regional space, which are signified in the recycling of organic waste that is interlocked with the economy and employment, and in effects of forests that play a role in carbon dioxide absorption, and on such environmental loads, the Model seeks to provide the appropriate space layout, designed for efficiency improvement in the environmental measures, based on the movement of organic waste, and to supply a structure that seeks optimization of transport patterns. The Model is effective for obtaining an optimal balance between the economy and the environment.

While noting the utilization of untilled farmland, we connected this issue with environmental conservation measures by studying the related matters from an overall viewpoint in wide perspectives. The answers were obtained only through simulation analysis using the Urban and Rural Linkage Model. This means that the Model attained much in clarifying the layout for organic waste treatment in broad regional space, so that its contribution to solving realistic issues is considered great.

Meanwhile, application of the Model to solving urban public contamination issues in developing countries is expected to represent effective contribution for developing countries, since this research brings income differential correction effects. Because data in developing states are not in such good order as in Japan, however, we hope that these developing states will deal with international cooperation after further reinforcing their research setups.