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An Approach to Creating Attractive National, Urban, and Regional Development through the Evaluation of Green Infrastructure and Its Social Implementation

Une approche pour créer un développement national, urbain et régional attrayant grâce à l'évaluation des infrastructures vertes et à leur mise en œuvre sociale

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RÉSUMÉ

Avec les changements liés au changement climatique et aux conditions sociales, les demandes sociales en matière de développement et de gestion des infrastructures évoluent également. Dans ce contexte, l'importance des infrastructures vertes croît, et leur renforcement a été convenu dans des cadres tels que le G7 et d'autres accords internationaux. La mise en œuvre réussie des infrastructures vertes nécessite des efforts transversaux impliquant le milieu académique, l'industrie et les gouvernements, ainsi que l'application de nouvelles technologies. L'objectif de cette étude est de proposer une nouvelle création de valeur pour les infrastructures vertes, en tant que contribution au développement de territoires nationaux, de villes et de régions attrayants. Plus précisément, cette étude vise à évaluer les effets des infrastructures vertes, en intégrant des perspectives telles que le bien-être, et à proposer une infrastructure de données pour une planification efficace. Elle explore également des incitations telles que des améliorations dans la planification et les systèmes, des dispositifs de certification et la monétisation des valeurs environnementales, tout en testant leur efficacité dans plusieurs régions. Afin de mettre en œuvre efficacement ces résultats dans la société, l'étude inclut également des initiatives pratiques pour le développement régional à travers des partenariats public-privé utilisant les infrastructures vertes, avec plusieurs régions modèles mises en place à cet effet.

ABSTRACT

With the changes in climate change and social conditions, the social demands for infrastructure development and management are also evolving. In this context, the importance of green infrastructure is increasing, and its enhancement has been agreed upon in frameworks such as the G7 and other international agreements. The successful implementation of green infrastructure requires cross-sectoral efforts involving academia, industry, and government, as well as the application of new technologies. The purpose of this project is to propose new value creation for green infrastructure as a contribution to the development of attractive national lands, cities, and regions. Specifically, this project aims to evaluate the effects of green infrastructure, incorporating perspectives such as well-being, and propose a data infrastructure for effective planning. It also explores incentives such as improvements in planning and systems, certification schemes, and the monetization of environmental values, while testing their effectiveness in multiple regions. To effectively implement these results in society, the project also involves practical initiatives for regional development through public-private partnerships using green infrastructure, with several model regions set up for this purpose.

KEYWORDS

Green Infrastructure, well-being, Certification system, Social implementation, Strategic Innovation Promotion Program

Infrastructure verte, Bien-être, Système de certification, Mise en œuvre sociale, Programme de promotion de l'innovation stratégique

1 INTRODUCTION

This project aims to establish a methodology for cross-sectoral and comprehensive evaluation of the functions of green infrastructure, build an inter-ministerial database for effective green infrastructure planning, and examine certification systems for effective green infrastructure implementation. Additionally, the project develops and applies methods for the introduction and maintenance of green infrastructure using digital technologies, while verifying their effectiveness. Over a five-year period from 2023 to 2027, the project focuses on five key areas of development, and the current presentation represents an interim progress report. Furthermore, this project is being conducted under the Strategic Innovation Promotion Program (SIP) Phase 3, "Development of Smart Infrastructure Management Systems," supported by the Cabinet Office's Science, Technology, and Innovation Council.

2 RESEARCH AND DEVELOPMENT ON GREEN INFRASTRUCTURE

2.1 Measuring and spatial mapping of multiple functions provided by green infrastructure and their contribution to well-being

This research aims to develop new methodologies for evaluating and mapping the multiple functions of green infrastructure. Key functions include disaster risk reduction, biodiversity conservation, and local revitalization, and the research will assess their potential, needs, and actual usage of the functions and their contribution to well-being. Currently, we are conducting a trial study in the Lake Imba watershed. This includes evaluating the location and status of natural capital and assessing needs of residents. This technical development is essential for determining the appropriate scale and placement of green infrastructure tailored to local needs. Moreover, we aim to establish a standard methodology applicable to other local areas. Additionally, the research will assess the impact of green infrastructure on well-being of local residents, visitors, etc. Ultimately, the goal is to integrate the methodology into local environmental impact assessments and business planning.

2.2 Development of a Data Foundation for Interministerial Collaboration on Green Infrastructure

Although research on natural capital and the development of spatial information are progressing, to systematically plan, develop, and manage green infrastructure, it is essential to consider existing social regulations and jurisdictional boundaries between ministries (such as forest areas, national parks, and agricultural regions). However, these boundaries differ by country, region, and municipality, making it difficult to integrate land-use plans from adjacent municipalities. Since the green infrastructure functions of natural capital span across administrative boundaries, it is crucial to share detailed land and planning information.

This research aims to centralize data related to natural capital, river environments, and land use held by relevant agencies and make this information easily accessible and usable. Specifically, it will involve centralizing wide-area land and marine zoning data, developing tools for integrating public data, and collecting and reorganizing detailed land-use planning data.

2.3 Consideration of Planning and Systems for the Implementation of Green Infrastructure

Land use plans and projects are being developed in various ways based on national systems; however, there has been limited intervention regarding the condition of land (e.g., land cover). The state and management of the land are crucial for the functioning of green infrastructure, yet the specific land conditions and management methods needed to realize these functions are not clearly defined. As a result, in Japan, the implementation of green infrastructure has not yet reached widespread, planned deployment.

In light of this, the research will assess how existing legal systems and projects impact land management and propose necessary improvements to address gaps. Furthermore, the role of private companies is also crucial for the effective functioning of green infrastructure. Therefore, an expert program on natural capital management utilizing digital technologies will be developed, aimed at fostering human resources within the private sector.

2.4 Consideration and Implementation of the Green Infrastructure Certification System

In order for diverse stakeholders to advance the implementation of green infrastructure, the introduction of incentives is necessary. An effective incentive would involve the objective evaluation of the various functions of green infrastructure, while simultaneously utilizing certifications widely used by local governments and industries. Specifically, the research will explore the establishment of a certification system as a support measure for local governments and businesses that are leading the implementation of green infrastructure, and set evaluation criteria. Additionally, it will propose the establishment of a certification body and the development of a review process. Through the development and implementation of the certification system, it is expected to contribute to private-sector financing, tax incentives, and the recognition of nature-positive evaluations in public projects.

2.5 Development of Green Infrastructure Introduction and Management Technologies

This project aims to develop green infrastructure plans for different regions in Japan, including urban and rural areas, and to test stakeholder consensus-building processes. In doing so, it will set specific goals for green infrastructure functions that respond to the needs of each region and create scenarios that combine existing infrastructure with green infrastructure. These scenarios will be revised using tools like digital twins and a specific consensus-building process will be constructed. Additionally, the interrelationships of regional challenges will be considered, and the consistency with existing land-use plans will be examined. The target regions for this project include the Inbanuma Basin in Chiba Prefecture, the Yazawa and Maruko River Basins in Setagaya Ward, Tokyo, and Inabe City in Mie Prefecture. New approaches to the introduction of green infrastructure, utilizing ICT and Web 3.0 technologies, will be proposed. After implementation, the effects will be evaluated and improved through a certification system. Ultimately, necessary data and tools for implementation and maintenance will be compiled, and guidelines will be created to enhance the information infrastructure.

2.6 Outputs from Five Perspectives

Through the five research and development areas 2.1 to 2.5, we aim to achieve the following outcomes from the perspectives of technology development (related to 2.1 and 2.2), business (related to 2.5), systems (related to 2.3 and 2.4), social acceptability (related to 2.1–2.5), and human resources (related to 2.3), as shown in the diagram below (Figure 1).

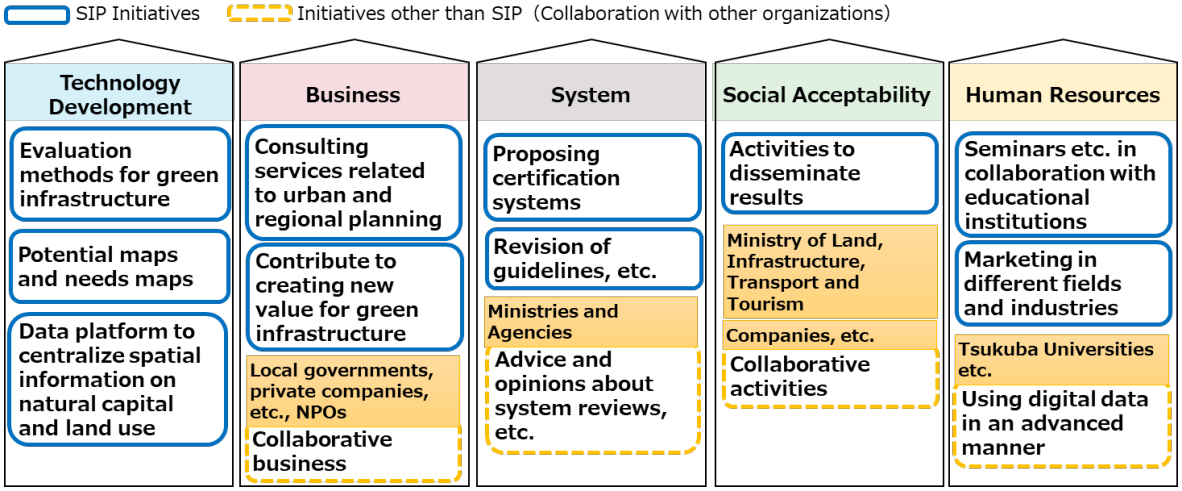

Figure 1. Efforts from Five Perspectives for Social Implementation

3 PAST ACHIEVEMENTS

So far, research and development on points 2.1 to 2.4 has been advanced, along with the experimental

implementation of results in the target regions of 2.5. Specifically, we have narrowed down the functions of the green infrastructure certification to 14 (Figure 2), designed a certification system, and conducted a trial of the certification system in one of the target regions, the Inbanuma Basin in Chiba Prefecture, focusing on the city of Sakura. In this process, hearings were held to identify areas for improvement. Additionally, a framework for evaluating the relationship between green infrastructure and well-being was newly developed with the aim of deepening the understanding of this relationship, and this framework was also tested through hearings in Sakura City.

Furthermore, in order to promote green infrastructure in the target regions of 2.5, systems and organizations were established. In the Inbanuma Basin, in collaboration with Shiroi City, an organization called the Landscape Management Center in Shiroi (LMCS) was set up to promote regional planning, system operation, and collaboration with private companies. The importance of the LMCS was also highlighted in the Shiroi City council. In addition to this, a symposium aimed at promoting green infrastructure was held with the support of Inzai City and Shiroi City under the auspices of this project. In other target regions of 2.5, the Setagaya Green Infrastructure School (organized by the ward) was established in the Tanasawa and Maruko River Basins in Setagaya Ward, Tokyo, to manage green infrastructure usage and citizen participation, while in Inabe City, Mie Prefecture, an experimental application for the utilization and maintenance of green infrastructure was developed.

At the national level, a tool was developed to classify types of green infrastructure that can be easily introduced based on land use master plans. This tool can help detect social conditions that are conducive to the preservation of green spaces, thereby supporting the introduction of green infrastructure. Additionally, further support for the introduction of green infrastructure includes the development of administrative support tools using PLATEAU data and the consideration of a human resource development program using these support tools.

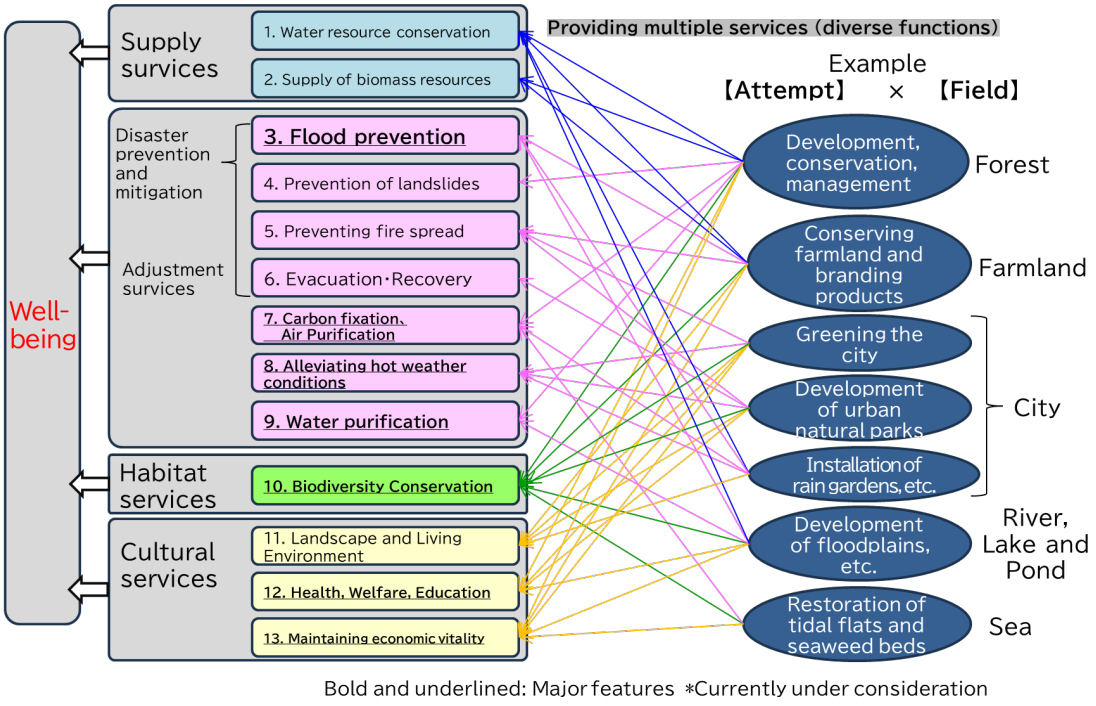

Figure 2. Green Infrastructure Function Classification