

Transdisciplinary Research Inspired by Kakenhi: Then and Now

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Research Theme Implemented in FY2015:

Development of system dynamic model of plantation to evaluate the sustainable production of crops by appropriate recycle of biomass residues (Grant-in-Aid for Scientific Research (S))



Starting with Scientific Research for Priority Areas

My experience with Grants-in-Aid for Scientific Research (Kakenhi) started with my inclusion as a team member in two projects in planned research. The first was an undertaking in the Scientific Research for Priority Areas category, on the theme, “Formulation and Management of Man-Environmental System” (1987–1992)¹⁾. This was followed by another in the same category, on “Man-Earth System: A scientific approach to realize human society in harmony with the Earth” (1993–1997)¹⁾. In the first project, I worked with a research group that focused chiefly on topics in genetic engineering and plant physiology. In the second, I was in a group that concentrated its investigations primarily in the area of ecology. These research projects in Priority Areas also had the participation of many investigators from the fields of law, economics, and other social sciences. In effect, I was working outside their specializations as a graduate from chemical engineering department. However, in two respects, this would prove highly beneficial to my subsequent research endeavors. First, it provided me opportunities to learn more about the research methods and concepts utilized in the fields of agronomy, biology, and ecology as well as the social sciences. Second, it helped immensely in the area of human networking, as many of my colleagues in those initial undertakings later invited me to participate in their own projects or conversely provided me with assistance or advice in projects of my own.

In the first Priority Area research cited above, I worked on a project with the theme, “Development of Bioreactor System for the Treatment of Chromate Wastewater and the Recycle of Chromium using Chromate Reducing Bacteria *Enterobacter cloacae* HO-1” With the support of researchers in the fields of bio-engineering and genetic engineering, I later won grant approval for a project in the category of Developmental Scientific Research, and expanded my activities into joint projects with private companies.

In the latter research in the Priority Area category, I pursued research on a project with the title, “Preservation, Rehabilitation and Enhancement of Ecosystems in Agricultural Land and Forest.” My current research theme in the category of Scientific Research (S) essentially ranks as an extension of that investigation, and is aimed at developing a system dynamic model for predictions of dynamic change stemming from the adoption of cultivation management and biomass recycling on tropical plantations. I am pursuing this research with the goal of developing models based on surveys including the collection and analysis of a range of data from the Indonesian island of Sumatra and sharing methodologies and knowledge that will contribute to the realization of self-sufficient, plantation-centered regional systems. In this undertaking as well, I can clearly feel the value of the many experiences and insights I gained through my earlier research in the Priority Areas category as well as the interpersonal networking I achieved with researchers from diverse backgrounds.

The two aforementioned research undertakings in the category of Priority Areas had the participation of several hundred researchers from dissimilar fields. As such, they afforded a favorable setting for the pursuit of environmental research that effectively cut across and tied together those fields while at the same time fulfilling an effective role in terms of training younger researchers. Regrettably, we no longer have these opportunities for large-scale projects in this category that bring together many researchers from disparate backgrounds.

Experiences as Senior Program Officer with the Research Center for Science Systems

Through environmental analysis, assessments, and investigations in the field of environmental conservation and restoration, environmental research strives primarily to contribute to the creation of a safe, secure, and sustainable society in which human activities are in harmony with the environment and its ecosystems. Kakenhi-backed efforts in this field developed steadily from the Environmental Science category and, through the two research projects in the Priority Areas category cited above, led to many accomplishments as well as the accumulation of extensive knowledge, insights, and experience. As one outgrowth, revisions to the grant system in FY2013 drastically expanded environmental research from one discipline with four research fields under the “comprehensive fields” area to three disciplines with 10 research fields under the “environmental science” area, and additionally encouraged undertakings in cross-disciplinary environmental research¹⁾.

When filing an application for Kakenhi funding, researchers are typically concerned more with the Grants program category or research field of their proposed research and how they will prepare their proposals, and are not as concerned about the budget for Kakenhi or how it is

secured. Conditions for and perspectives about the Kakenhi system have been summarized in an interim report by the Subcommittee on Basic Research and Human Resources Development, an organization within the Cabinet Office's Council for Science, Technology, and Innovation². While noting that the Kakenhi system now accounts for 60 percent of all competitive research funding and has continued to show pronounced growth despite serious fiscal budget constraints, the report also points out that the number of research papers originating in Japan has shown little growth compared to trends in Europe and North America. This may sound as though I'm preaching to the choir here, but the Kakenhi system provides competitive research funding aimed at fostering advances in creative, pioneering scientific research backed by the independent ideas of researchers themselves, and harnesses peer review-based application screenings for that purpose. However, the views cited in the subcommittee report above could raise doubts about the peer-review process or the notion of research backed by independent ideas—something that researchers would be unwilling to give up. Due to cuts in their management expenses grants, many national universities have experienced continued declines in their basic budgets for research. Consequently, Kakenhi have become a lifeline for the pursuit of research endeavor.

Under these circumstances, from a long-range perspective, efforts are needed to staunchly defend the policy of peer review and the notion of research backed by independent ideas, foster intensified levels of research in all fields, develop new fields of research endeavor, and train the researchers that will assume leading roles in those new fields. Achieving all of these goals together will demand that the Kakenhi framework be sustained and expanded while fulfilling the obligation of accountability, and that achievement will depend on the researchers' activities and communication skills to distribute optimal information.

The Council for Science and Technology Policy (CSTP) has been renamed the Council for Science, Technology and Innovation with heavy stress on the key word, innovation. Decisions made on developing and implementing new technologies and systems on a societal scale will call for a multifaceted analysis and evaluation of their benefits and drawbacks, together with judgment based on comprehensive gauges of acceptance by stakeholders and other members of society. To effectively and efficiently achieve innovation, it would be desirable to create new academic disciplines and scientifically based methods backed by the transdisciplinary integration of knowledge from multiple fields that will facilitate new ideas, R&D, assessments, and social applications. This will be a challenge involving the coordination and unification of researchers from diverse fields, and pursuits in transdisciplinary research will be essential to that end.

I am told that starting with Kakenhi applications in FY2014, a new “Generative Research Field” category of research was created and a “study section” approach to application screening was instituted. Application screening is a task that demands enormous investments in time and labor. However, I look forward to seeing steps taken to reinforce and expand the screening framework and the institutions that distribute competitive research funding, increase opportunities for the selection of applications based on healthy debate by application referees from diverse fields, and spur the development of new transdisciplinary research fields.

Footnotes

1. Motoyuki Suzuki *et al*, “The Formulation of the Environmental Science Filed in the Progress of Environmental Research” (Parts 1, 2), in KAKENHI News, FY2012, Vols. 2, 3.
2. Summary of interim report by Subcommittee on Basic Research and Human Resources Development, Council for Science, Technology and Innovation, Cabinet Office (<http://www8.cao.go.jp/cstp/tyousakai/innovation/jinzai/>)