

2. Research Activities (Apr. 2006- Mar. 2007)

2.1 Outline of Activities

(1) Center

Arid Land Research Center (ALRC) is an independent department of Tottori University and at the same time is a National Joint-use Research Facility. The mission of the ALRC is to conduct research on desertification and to develop sustainable agricultural practices in arid and semi-arid areas. The door is open to all teachers of universities who are engaged in this field of study.

The ALRC's Program for Arid Land Science was adopted as a 21st Century COE program in 2002. The aim of this program is to construct the new arid land science that is unparalleled worldwide. The ALRC etc. (including the predecessor), have accumulated knowledge and technology of plant production and vegetation recovery in sands over the past 80 years. We are advancing this knowledge and technology to those that are used easily for the arid lands on the world. To achieve our goal, we fuse knowledge and technology of public health and energy engineering. The mission of this program is to contribute towards environmental sustainability through development of technical package that will be easily adopted by arid land inhabitants. Achievement of this objective forms the foundation of designing our national arid land science as a worldwide top-level program in this field. Consequently this will contribute to increasingly technological support of Japan as a UNCCD ratification country.

In 2001, we started for the Core University Program (by JSPS) focusing on combating desertification and developmental utilization in inner area of China between Arid Land Research Center, Tottori University and Water and Soil Conservation Research Institute, CAS in China.

Organization, Management, and Funding Subsidies

ALRC is managed by the Director, a Conference composed of professors and associate professors, a Board of Management composed of members from outside as well as professors of ALRC, the five research divisions, the office section and the technical section. In practice the Conference and the Board of Management operate our Center.

The five divisions are:

- 1) Arid Land Environment: Natural Environment, Water Resources
- 2) Biological Production: Plant Ecophysiology, Plant Production
- 3) Afforestation and Land Conservation: Revegetation and Grassland Development, Land Conservation
- 4) Comprehensive Measures to Combat Desertification
- 5) Arid Land Sciences (Visiting)

The three full-time divisions from 1) to 4) have five professors, six associate professors and one Junior Associate professor. The Visiting division has two visiting professors and one associate professor from Japan and three visiting professors from abroad. In addition, 11 project researchers are stationed at ALRC. Ten office staff (five clerks and five associate clerks), four technical officers and a research support technician support the research and education.

With regard to the funding, subsidies for scientific study in the fiscal year of 2006, a total of four themes were adopted:

Grant-in-Aid for Scientific Research (A) : 2,

Grant-in-Aid for Scientific Research (B)	: 2,
Grant-in-Aid for Scientific Research (C)	: 1,
Grant-in-Aid for JSPS Fellows	: 3,
Grant-in Aid for Young Scientists (B)	: 5,

With regard to other research funding, a total thirteen themes were accepted:

Research Bounty Received	: 5,
Research Fund Received	: 4,
Cooperative Research with Private Sector	: 6

Joint-Use Research, Education, Publication

During the fiscal year of 2006, 55 Joint-Use Researchers (Teachers from national and private universities) were attached to the Center. The number of students as of October 2006 is 60 (17 Ph.D. Students, 22 Master Students, 20 Undergraduate Students, 1 Research Student).

Seminars were often held by a large number of internal and external experts. The foreign visiting professors periodically give seminars.

Annual report has been published since the establishment of ALRC, which provides a brief overview of the activities in its various divisions and also summarizes our research and education.

The 16th seminar of Joint Research was held on December 5, 2006 at Arid Land Research Center, Tottori University. 8 presentations and 31 poster presentations were performed.

The United Nations General Assembly has declared 2006 as the International Year of Deserts and Desertification (IYDD) and ‘International Symposium “Living with Deserts - Dryland Science and Practices on the Ground –“ was held at United Nations University, Tokyo on August 25, 2006. ‘International Conference on Dryland Studies and Combating Desertification’ was also held in Tottori, on August 27 - 28, 2006.

On August 28-29, Core University Program ‘CAS-JSPS Core University Program Japan-China joint open seminar on combating desertification and development in inland China of year 2006’ was held in Tottori.

On March 2-11, ‘Dry Earth – Desert, Human and Nature ~ Desire for water and Green’ was held at National Museum of Nature and Science, Tokyo.

(2) Divisions

1) Division of Arid Land Environment

Subdivision of Natural Environment

The staff in the subdivision consists of Dr. Shinoda, M. (Professor), Dr. Kimura, R. (Associate Professor), and Ms. Yonehara, A. (Associate Clerk, also assigned to the Subdivision of Water Resources). There were two doctoral foreign students (from Mongolia and Sudan), three master’s students (including one from China), and four undergraduate students during the fiscal year 2006.

The Natural Environment Subdivision conducts meteorological and climatological research especially on the dynamics of the natural environment in the arid regions of the world. The studies focus on the interaction between the large-scale climate and terrestrial ecosystems (including agricultural ecosystems) through water and energy circulation. This subdivision aims to develop a desertification index and to obtain

a more clarity of understanding on the effects of desertification over agricultural production by utilizing ecoclimatological and remote sensing approaches. The current research topics are given as follow:

- (1) Drought experiment in a Mongolian grassland
- (2) Climate memory dynamics of terrestrial ecosystems over the Asian-African arid region
- (3) Developing an early warning system of drought and dzud in Mongolia (JICA project)
- (4) Heat and water balances in the arid lands
- (5) Development of an index for monitoring desertification
- (6) Monitoring vegetation cover and vegetation vigor in arid regions, using the property of spectral reflectance
- (7) Analysis of wind climate and sand movement in the Tottori Sand Dune

Subdivision of Water Resources

The subdivision of water resources carry out research on the development of water resources, conservation of water resources, irrigation and drainage practices to prevent desertification and to develop a sustainable agriculture in the arid and semiarid regions.

Staff and students: The staff consists of Dr. Anyoji, H. (Professor), Dr. Yasuda, H. (Associate Professor) and Ms. Yonehara, A. (Associate secretary, also assigned for the subdivision of natural environment), two doctoral students, one master's student, one foreign researcher, one JSPS postdoctoral foreign researcher, one JSPS postdoctoral researcher, and four under-graduate students.

One doctoral student was graduated from the united graduate school of agricultural science and went back to his country. A foreign researcher and a JSPS postdoctoral foreign researcher went back to their countries after the completion of their tenures. Two under-graduate students were graduated from the department of agriculture and got jobs in the private companies.

Research in Japan: Research on efficient use of water for irrigation, accurate estimation of plant transpiration and soil evaporation, reduction of soil evaporation during irrigation, effective use of rainfall for irrigation scheduling, and up-scaling of soil hydraulic properties are being conducted in Japan as well as abroad to prevent the desertification and to develop the sustainable agriculture in arid and semiarid regions.

Studies in Japan: Efforts are being made to carry out research on hydraulic design of irrigation systems, separation of plant transpiration and soil evaporation from evapotranspiration, scale dependence of soil hydraulic properties, and runoff and infiltrated water from rainfall in the laboratory and a greenhouse.

Overseas Research: Hydrological data and data of groundwater tables are being collected at the Loess Plateau in China as a part of 21st COE research program activities. Research on the solute movement in the heterogeneous soil was carried out jointly at Lund University in Kingdom of Sweden. Irrigation and water harvesting methods were also investigated in Jordan.

Cooperative research projects have been conducted with the following researchers: Professor Nishiyama, S. (Faculty of Agriculture, Yamaguchi University) and Dr. Aoda, T. (Faculty of Agriculture, Niigata University). The titles for these research projects are listed in the joint research section of this Annual Report.

2) Division of Biological Production

Subdivision of Plant Ecophysiology

Staff: The staff consisted of Dr. An, P. (Associate professor), Dr. Inanaga, S. (visiting professor) and Ms. E. Tomemori (Associate Clerk, also assigned to the subdivision of Plant Production).

Studies in Japan: The main research work of the subdivision is related to the eco-physiological studies of the plant growth and yield responses to salinity and drought stresses, biochemical and molecular-biological studies on plant abiotic stresses and plant indicators of desertification. Joint research projects have been conducted with several researchers (Drs. E. Tanimoto of Nagoya City Univ., J. Abe of the Univ. of Tokyo, G. Chizaki of the Global Environmental Forum, A. Matsuura of Kyushu Tokai Univ. and H. Araki of Yamaguchi Univ.) on root system development under arid conditions, water relations in plants under drought, and assessment of desertification. In other joint research activities, studies on plant growth responses to salt and drought stresses, plant succession in desertified areas of China, environmental education for local peoples and plant genetic studies were conducted with Dr. U. Qiman (Professor, Xinjiang Agriculture University), Dr. Y. R. Zheng (Professor, Institute of Botany of the Chinese Academy of Sciences), Dr. Abdelbagi M. Ali (Professor, Agricultural Research Corporation, Sudan) and Dr. J. M. Li (Professor, China Agricultural University). Also, studies on the sustenance of oasis ecology have been conducted jointly with Dr. T. Matsui (with funding from Mitsubishi Heavy Industries, LTD.). In addition, Dr. An joined the 21st Century COE Program, Arid Land Science Program, launched in 2002 by The Ministry of Education, Culture, Sports, Science and Technology. She was also joined the JSPS Core University Program, combating desertification and enhancement of rural development in inland China and AA Science Platform Program, agricultural problems in Sudan and the countermeasures. Seven research articles and a book were published during the year.

Studies abroad: Dr. An visited the Institute of Soil and Water Conservation, Institute of Botany, Shanghai Institute of Plant Physiology and Ecology, Cold and Arid Regions Environmental and Engineering Research Institute and the Institute of Genetics and Developmental Biology of the Chinese Academy of Sciences, Xinjiang Agricultural University, Beijing Normal University, China Agricultural University, Shanghai Jiaotong University, Zhejiang University, and Tongji University to connection with the research projects being carried out in the subdivision, Core University and the COE programs. One Ph.D. student, W.Q. Li, and two M.Sc. students, I. Takeda and Y. Demachi, visited Mu Us Sandy Land in China with Dr. An to identify the plants indicators for desertification and to investigate soil environments.

Students: There were two Ph.D. students [one in 3rd grade– K. Sonobe, one in 1st grade– W. Q. Li (government-financed foreign student from China)]. There were seven M. Sc. students [three in 2nd grade– K. Ishii, L. N. Yin (government-financed foreign student from China), and O. Kaseda, four in 1st grade– I. Takeda, Y. Demachi, K. Masuda and Y. Matsunaga]. There are three undergraduate students (two in 4th grade – A. Yamaguchi and T. Soutome, one in 3rd grade – M. Nakajima).

One of the M. Sc. students, K. Ishii, got employment in the Ministry of Agriculture, Forestry and Fisheries of Japan. The other two continue their Ph. D. studies in the subdivision. Two undergraduate students got jobs in Semba Co., Ltd and Peshawar-kai (NGO). The rest of the students have continued their studies in the subdivision.

Additional assignments: Dr. An was appointed a member of the Committee of Technology Transfer for Combating Desertification by the Ministry of the Environment of Japan (Global Environmental Forum).

Subdivision of Plant Production

The Plant Production Subdivision conducts research on the monitoring and modeling of the plant

production and ecosystem change in the dry lands. Particular efforts are being made to clarify the interaction between the atmosphere and the land surface (vegetation and soil) through water and dust, and to develop methodologies for evaluating the sustainability of ecosystems and local communities in dry lands. The research of the subdivision is driven by combining the use of information technologies such as numerical modeling, remote sensing and geographic information systems (GIS); field observations; and experiments using Center's facilities.

The staff of the subdivision consists of a Professor (Dr. Atsushi Tsunekawa), an Associate Professor (Dr. Mitsuru Tsubo) and an Associate clerk (Ms. Emako Tomemori). Four students were attached to the subdivision in the fiscal year: three doctoral course students (Mr. Baolin Zhang from China, Mr. Shunichiro Nishino and Ms. Takako Koike) and a master's course student (Ms. Tserenpurev Bat-oyun from Mongolia). The main research topics in the fiscal year were as follows:

- Monitoring the habitat environment of Mongolian gazelles in the steppe
- Monitoring the Yellow dust from Northern China
- Evaluation of agricultural sustainability in Periurban villages in China
- Evaluation of drought impact on crop production in Southern Africa

Overseas research activities during the fiscal year: Dr. Tsunekawa visited the Institute of Soil and Water Conservation (ISWC) of the Chinese Academy of Science (CAS) in the Central China three times under the Core University program. The purpose of his visits were to work out a master plan for developing a community-based participatory system for combating desertification in Inland China and deploying environmental education in the decertified area. Those visits were also related to the research exchange with Chinese scientists involved in the research project. He also visited U.S.A. under the 21st century COE program in connection with the Global Network of Dryland Research Institutions, which was founded in February 2006. Dr. Tsubo visited China and South Africa for research purposes and participated in a conference held in Algeria on Desertification, since Year 2006 was declared by the United Nations as the 'International Year of Deserts and Desertification'.

3) Division of Afforestation and Land Conservation

Subdivision of Revegetation and Grassland Development

The present staff of this subdivision consists of the following staff: Dr. Tamai, S. (Professor), Dr. Yamanaka, N. (Associate professor), Ms. Hamamoto, N. (Associate clerk, also assigned for the Subdivision of Land Conservation). Presently the subdivision has 3 Doctoral, 3 Master course and 2 undergraduate students. The research of the subdivision focuses on the afforestation in the semi-arid areas, especially on plant communities and their specific characteristics. The research mainly covers the following topics: (1) the distribution of plants in semi-arid land and its specific characteristics, (2) the maintenance mechanisms of the plant communities in arid areas, (3) the relationships between water and nutrient dynamics, and the growth of trees, (4) the dynamics of plants in sand dunes, and (5) the salt tolerance of woody plants.

The most important research in this subdivision is related to the afforestation and prevention of desertification in semi-arid areas by native plants. Currently the vegetation of China is mainly analyzed.

Studies on the revegetation and natural vegetation are under progress in Turkey, Brazil and China. Prof. Tamai visited Turkey two times (13 Jun.-24 Jul. 2006 and 10-15 Feb. 2007) to conduct field survey on forest vegetation, as a part of the research activities on the 'Impact of climate change on agricultural

production in arid areas' in collaboration with the Research Institute for Humanity and Nature. Dr. Tamai also visited Brazil twice (22 Feb.-19 Apr. 2006 and 6 Sep.-11 Oct. 2006) to carry out research studies on revegetation and grassland development.

Dr. Yamanaka visited Xaanxi Province of China during Jul, Aug. and Sep. 2006, for the research investigation on the revegetation of Loess Plateau. In Sep. 2006, Dr. Yamanaka visited Xin jiang Province of China and carried out the field research on halophyte. He also visited Inner Mongolia of China in Feb. 2007 and initiated a joint study on the Tamarix species together with Inner Mongolia Forest research Institute.

The distribution and growth of trees in semi-arid areas mainly depends on water availability and soil nutrients. The research on the dynamics of water and plant nutrients in the tree-soil systems has been conducted. The investigation aims to clarify nutrients dynamics in the soil with changing soil water potential using six large scale lysimeters in the vinyl houses. Drought tolerance and water relation of *Salix* species, *Quercus* species and *Robinia pseudo-acacia* planted in China was studied during the year 2006.

Salinity of the soil in the semi-arid land sometimes becomes a hazard for the germination, establishment and growth of trees. The research work on the ecology and ecophysiology of salt tolerant trees are under way. The effect of salinity on the growth of *Tamarix austromongolica* was investigated during 2006. Studies on the afforestation of hardwood (ex. *Robinia pseudo-acacia*) in pine forests damaged by pine wilt disease on coastal sand dunes, are also being progressed. Ecological research on the plants grown in sand dunes and the studies on the growth and the reproductive characteristics of woody plants in arid areas has also been conducted. Cooperative research on the drought stress tolerance of trees was conducted with the scientists as a joint research in the center. Numerous trainees from the abroad were briefed about the subdivision activities.

Subdivision of Land Conservation

The main studies in this subdivision are related to the dynamics of moisture and salts in the soil under arid conditions. The mechanism of soil erosion by water and break down of soil aggregates were also studied to promote research on the control and management of land desertification. The staff consisted of Dr. T. Yamamoto (Professor), Dr. M. Inoue (Associate Professor), Ms. N. Hamamoto (Associate clerk assigned to the entire Division) and fourteen students. Six students (included four foreign students) are enrolled for doctoral course at the United Graduate School of Agricultural Sciences, six (included one foreign student) as master course students, and two students as an undergraduate in the Faculty of Agriculture.

The main domestic research titles are as follows; 'Effect of water pollution on clogging of emitters and filters of a microirrigation system' supported by the Ministry of Agriculture, Forestry and Fisheries since 1992, 'Soil conservation and afforestation in wilderness soil of dryland' supported by Miyazaki Kagaku Co., Ltd., 'Effective utilization using DD lime' supported by Nippon Carbide Industry Co., Ltd., 'Development of measurement techniques for the solute transport in undisturbed soil column and downward flow through root zone in an irrigated farmland under arid conditions' supported by Monbukagakusho Grant-in-Aid for Scientific Research B(2) , 'Development of a simple technology for measuring nitrate nitrogen in soil water of sand dune fields' supported by the Tokushima Agricultural, Forestry and Fisheries Technology Support Center Agriculture Institute, 'Development of simultaneous measurement of water content, salt concentration and temperature in actual unsaturated soil' supported by Sankei-Rika Co., Ltd., and 'Evaporation properties of well-ventilated soil for improving purification

function' supported by R & K Co. Ltd.. Finally, under the 21st Century COE Program for Arid Land Science, the studies belong to environmental monitoring and environmental restoration technology groups were initiated using three dimensional soil water erosion analyzing system, monitoring system for water flow and solute transport and desertification mechanism analysis system installed in the Arid Land Dome.

As a joint research with other divisions of the universities, this subdivision carried out studies on (1) Soil degradation in arid land together with Dr. T. Nishimura (Tokyo Univ. of Agric. and Tec.), Dr. T. Tanigawa (Osaka Prefecture Univ.), and Dr. Y. Kihara (Shimane Univ.), (2) Free subject on arid land studies, with Dr. N. Sasaki (Hirosaki Univ.), Dr. K. Takeyama (Shimane Univ.), Dr. Furukawa (Tottori Univ.), Dr. K. Roy (Nihon Univ.), Dr. Y. Ishikawa (Akita Pref. Univ.), Dr. Kamichika (Tottori Environment Univ.), Dr. Y. Kitamura (Tottori Univ.), Dr. N. Toride (Mie Univ.), Dr. K. Inosako (Tottori Univ.), Dr. H. Cho (Saga Univ.), Dr. K. Kamiya (Gifu Univ.), Dr. Y. Mori (Shimane Univ.), Dr. T. Morii (Niigata Univ.), Dr. Y. Takeshita (Okayama Univ.), Dr. T. Yamada (Tottori Univ.), Dr. H. Fujimaki (Tsukuba Univ.), and Dr. K. Kondou (Kumamoto Pref. Univ.).

Dr. T. Yamamoto has continued a joint research on the 'rehabilitation of degraded soils in Western Australia'. From March 22nd to 28th, 2007, T. Yamamoto and A. Okamoto, a fourth year grade, attended the research seminar which was organized with Professor Donke-ke Zhang, Director of Center for Fuels and Energy, Curtin University of Technology. The previous research results were presented and discussed fully with his staff and the retired Dr. L. Martin of Muresk Institute. Miss Okamoto also presented on application of artificial zeolite for soil improvement in wheat and grass fields of Muresk Institute, Curtin Univ. of Technology. A memorandum of understanding (MOU) was also signed for the academic exchanges and cooperation between the Curtin University through Muresk Institute and Tottori University in Nov. 2006 as result of the joint research since 2002.

Dr. M. Inoue visited the Institute of Soil and Water Conservation of the Chinese Academy of Sciences on 25 Sep.-4 Oct 2006, based on the Core University Program on the 'Research on Combating Desertification and Developmental Utilization in the Inland China'. During the research trip, he measured the soil temperature and moisture distribution patterns to determine the relationship between soil degradation and reduction in crop yield following repeated vegetable cultivations in plastic greenhouses during winter season.

Mr. Shingo Yamazaki (Ph.D. student) made presentation on the 'Water use efficiency and salts distribution in a soil as affected by subsurface irrigation with saline water at two depths in a sandy soil' in the Symposium of Japanese Society of Soil Physics in Oct. 2006. Mr. Shigeoki Moritani (Ph.D. student) also presented his research entitled 'Discussion on the readily available moisture for vegetated plant growing on sloped bed soil' in the annual meeting of JSIDRE in Aug. 2006.

4) Division of Comprehensive Measures to Combat Desertification

Division of comprehensive measures to combat desertification conducts research on sustainable use of biological resources and local development through the participation of local people, on the basis of cultural anthropological research on pastoral systems, indigenous knowledge and resource management.

The staff in the division consists of Dr. Hiroshi Nawata (Junior Associate Professor). There is no doctoral student, foreign research student or visiting scholar in the division.

Overseas researches in the fiscal year of 2006 were conducted in Republic of Sudan, Democratic People's Republic of Algeria, and Peoples Republic of China.

In the Sudan, Dr. Nawata, H. have joined AA Platform Program (JSPS) “Water management and parasitic weed control for sustainable food production in Sudan” headed by Prof. Sugimoto, Y. (Faculty of Agriculture, Kobe University) as a member from the cooperated institution, ALRC, since April 2005. He attended the conference called “JSPS AA Science Platform Program Seminar on Prospects of Water Management and Parasitic Weeds Control in Sudan” and made an oral presentation entitled “Recent Situation and Some Issues of Sorghum Production in Butana, Central Sudan”. He also conducted a field survey on a problem of the exotic invasive weed *Prosopis* sp. from Nov. 3 to Nov. 19, 2006.

In Algeria, from Dec. 13 to Dec. 31, 2006, Dr. Nawata conducted a general field research on social, cultural, economical and religious aspects in northern Algeria, and from Mar. 20 to Mar. 27, 2007 collected literature on conflicts in Muslim societies of Africa in the library of the Arab World Institute, funded by Grant-in-Aid for Scientific Research (A) (Ministry of Education, Culture, Sports, Science and Technology), “Religious anthropological studies on conflict and coexistence between white and black peoples in Islamic zones of Africa,” headed by Prof. Shimada, Y. (Graduate School of Letters, Nagoya University).

In China, Dr. Nawata, H. have joined JSPS Core University Program “Combating Desertification and Enhancing Rural Development in Inland China,” and started human life studies in the Loess Plateau mainly from social ecological perspective since April 2005. He conducted to have a field research with his two teams: “Studies on land use change in the Loess Plateau (China) by remote sensing/GIS analysis and field survey,” with Dr. Sato, R., Prof. Nagasawa, R. and Dr. Buhe, A. and “Basic investigation for constructing the humanities and social network about the Loess Plateau desertification measures,” with Dr. Muramatsu, K. and Dr. Fukao, Y., from June 5 to June 14, 2006, from Sep. 10 to Sep. 16, 2006. Further, Dr. Nawata, H. obtained Showa Shell research grant for environmental studies under the title of “Studies on land use change before and after ‘grain for green’ project of China” with Dr. Buhe, A. since Oct. 2006, and continues to analyze land use change in China.

As for presentation at international meetings, Dr. Nawata, H. made his poster presentation “Further development of multi-dimensionality of human-camel relationships in the coastal zone of the arid tropics,” at UNESCO-organized international scientific conference ‘The Future of Drylands’ Tunis, Tunisia, funded by the Dispatch for International Meetings (JSPS), from June 17 to June 24, 2006.

Within Japan, Dr. Nawata, H. keeps promoting basic studies on comprehensive measures to combat desertification, local development applying indigenous/traditional knowledge, and pastoral systems in dryland areas. He makes his large efforts to build a new framework of arid land sciences through cooperating with the humanities and social sciences, by joining in 21st Century COE Program “A New Arid Land Science” as well as his own funds from Grant-in-Aid for Young Scientists (B), Ministry of Education, Culture, Sports, Science and Technology on “Basic studies to combat desertification by applying traditional pastoral systems” since April, 2005.

Research Institute for Humanity and Nature, Inter-University Research Institute Corporation, National Institutes for the Humanities accepted an application of Dr. Nawata, H. for 2006 Incubation Studies. His research project’s title is “A Study of Human Subsistence Ecosystems among Arab Societies: To Combat Livelihood Degradation,” aiming to promote basic studies to examine the interaction between human and nature in drylands, for the purpose of ensuring sustainability of subsistence activities and combating livelihood degradation in local communities of the Arab people. This will clarify human subsistence ecosystems by focusing attention on human life support mechanisms and self-sufficient modes of production (hunting, gathering, fishing, herding, farming, and forestry). Based on these research results, the research project intends to propose, a scientific framework to strengthen the subsistence productivity and

rehabilitation measures for the daily lifestyles of the common people within Arab societies.

Dr. Nawata, H. published series of articles unveiling survival strategies of ethnic groups living in dryland areas. A study on an adaptive mechanism of the pastoral Beja of eastern Sudan to the Red Sea coastal zone through camel pastoralism consists of “Human-camel relationships in coral reef and mangrove ecosystems,” (May 2006), and “Food habitat in the coastal zones of the arid tropics: A case of the Beja in eastern Sudan,” (June 2006). A study of resource management system and wild animals/plants utilization of the agro-pastoralists in juniper forests in Asir mountains of southeastern Saudi Arabia includes “Social importance of the junipers” (Jan. 2007).

In Japan, Dr. Nawata, H. made his poster presentations and oral presentations on arid lands from broad perspectives at various meeting such as Japan Association for Nilo-ethiopian Studies (Apr. 2006), the Japanese Association for Arid Land Studies (May 2006), Japan Association for Middle East Studies (May 2006), Japanese Society of Cultural Anthropology (June 2006).

Making networks with human and social scientists by joining Inter-University research projects of National Museum of Ethnology, “Anthropological studies on building a global environmental history” organized by Dr. Ikeya, K. and “Studies on development and indigenous peoples” organized by Dr. Kishigami, N. since Oct. 2005, Dr. Nawata, H. co-organized an international symposium on “Development cooperation of Norway” (Nov. 2006), and presented papers on “Promoting a project in the Sudan: A study of human subsistence ecosystems to combat livelihood degradation.” He also joins an another Inter-University research project, Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies, since Oct. 2005 on “Studies on Muslim livelihood and its change” organized by Prof. Otsuka, K., and made a review on “The Middle East and Islamic cultures from material-centered perspectives” (July 2006).

After Dr. Nawata, H. made his special lectures on the hunger and civil war of Africa based on his experience at Affiliated Secondary School, Tottori University (Nov. 2005), he continues to promote the development of practical and theoretical educational research for an understanding of the hunger and civil war of Africa on educational fronts in Japan. To set it out for children as a more familiar and self-related issue, he highlights the Pulitzer-winning photograph “Vulture and a Child” (vulture stalking a starving Sudanese girl), that has been used in an English textbook of the junior high school and influential to the Japanese society in depth. After delivering his own personal experience, consideration and activity as the Japanese who was the nearest to the photography spot at time and space in southern Sudan and had a chance to know the real situation there at that time, he discusses with students directly at classrooms. He also talked on camels for children under the title of “Asking for Dr. camel: Living with camels in a desert” at United Nations University for the International Year of Deserts and Desertification Tokyo Event (Aug. 24, 2006).

For class lectures, he is in charge of “Outline of biological production in arid lands” for undergraduate students, Faculty of Agriculture since Oct. 2004, and “Cultural anthropology in arid lands” for graduate students, Graduate School of Agriculture since Apr. 2005.

Dr. Nawata, H. organized symposium and seminars as follows: International Open Seminar of ALRC “Learning from traditional knowledge in arid lands: Paradigm change in combating desertification” with Prof. Kobori, I., Dr. Laureano, P., Prof. Shimada, Y., Dr. Nawata, H., Prof. Hori, N., Prof. Hakoyama, F., Dr. Krohmer, J., and Prof. Takaki, K. (Aug. 28 to 29, 2006), Tokyo Open Seminar of ALRC with Research Institute for Oriental Cultures, Gakushuin University “Tomorrow for the Loess Plateau, China and Japan: How to relate yourself with the area” with Dr. Yamanaka, N., Dr. Nawata, H., Dr. Buhe, A., Mr.

Matsunaga, K., Dr. Koretsune, T., Ms Oda, A., Dr. Fukao, Y., Dr. Yasutomi, A., Mr. Takami, K., Dr. Sugano, E., Dr. Ichiki, K. and Dr. Muramatsu, K. (Feb. 17, 2007).

In terms of the Cooperative Research Program of ALRC, Dr. Nawata, H. conduct cooperative research programs: “Studies on land use change in the Loess Plateau (China) by remote sensing/GIS analysis and field survey,” with Dr. Sato, R., Prof. Nagasawa, R. and Dr. Buhe, A., “Basic investigation for constructing the humanities and social network about the Loess Plateau desertification measures,” with Dr. Muramatsu, K. and Dr. Fukao, Y., “Resource use and resource management in the semi-arid lands: the case of cattle and camel pastoralism” with Dr. Ikeya, K. from April, 2005, “Control of noxious plants to plant production in semi-arid regions” with Prof. Sugimoto, Y., “Rethinking desertification from the human life desertification point of view” with Prof. Shimada, Y. and Ms Kodama, K., “Poverty reduction programs in arid regions in Africa” with Prof. Hakoyama, F., “Study of the material culture on the Sinai peninsula of Egypt” with Prof. Kawatoko, M., Dr. Shindo, Y. and Dr. Tokunaga, R. from April, 2006.