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**ENERGY FOR RURAL DEVELOPMENT
REPORT AND RECOMMENDATIONS
OF THE RESEARCH COMMITTEE**

**Pattaya, Thailand
October 1980**

**National Research Council of Thailand
East-West Resource Systems Institute**

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NATIONAL RESEARCH COUNCIL OF THAILAND
EAST-WEST RESOURCE SYSTEMS INSTITUTE

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INTRODUCTION

The Energy for Rural Development (ERD) Research Committee met in Pattaya, Thailand on October 20-22, 1980 as decided at the Steering Committee meeting in July 1980 to evaluate program progress and recommend forward implementation activities pursuant to the Chiang Mai Plan¹ and Steering Committee decisions.² The Committee's report and recommendations follow, as transmitted to Steering Committee members for approval prior to publication.

Dr. A. Arismunandar
Chairman
ERD Research Committee

The ERD Steering Committee has reviewed the Research Committee report of October 22, 1980 and accepts the Committee's recommendations in their entirety.

Dr. Sanga Sabhasri
Chairman
ERD Steering Committee
November 21, 1980

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1. Energy for Rural Development: Implementation Plan for Inter-Country Research Activities, 1980-1983. National Research Council of Thailand and East-West Resource Systems Institute. Honolulu. April 1980.

2. Energy for Rural Development Steering Committee Decisions and Program Management Plan. National Research Council of Thailand and East-West Resource Systems Institute. Honolulu. July 1980.

I. REVIEW OF WORK ACCOMPLISHED AND RECOMMENDATIONS ON COUNTRY PROJECTS AND PROPOSALS

A. Activity Set Review

The Committee undertook to evaluate the status of work in each of the four Activity Sets structured at the July meeting. This review involved four steps:

1. Reports by members present on the status and interim products of projects already underway.
2. ERD Secretariat presentation and assessment of country proposals as re-formulated to meet the standards of ERD proposal guidelines or United Nations Interim Fund for the Science and Technology for Development (UNIFSTD) detail requirements.
3. Review and critique of re-formulated proposals in each Activity Set by a Committee member as a basis for Committee discussion.
4. Recommendations by the Committee.

Resulting from this process of review, the updated status and recommended action on each ERD Country Project and Proposal are presented in Appendix 1. Table 1 summarizes the current status of projects and proposals for each Activity Set.

Preliminary reports by the Resource Systems Institute (RSI) on work in progress in the ERD program with support from the United States Agency for International Development (USAID) grant were received by the Committee. These reports, as well as a basic ERD Thesaurus and the first of a series of Annotated Bibliographies designed to contribute to the research infrastructure of the cooperative program, are being distributed to all ERD participants. In addition, the Committee received a final draft report of research earlier initiated by Dr. M. Nurul Islam with sponsorship of the Bangladesh University of Engineering and Technology (BUET) and International Development Research Centre (IDRC), on which Dr. Islam had presented his preliminary report at the first ERD planning meeting. These research reports and reference materials are cited in Appendix 2.

The Committee, after considering the focus, relevance, and relationships of work achieved and initiated, concluded that the four Activity Sets form a viable structure for linking the specialized research capabilities of the different institutions and concentrating the efforts of country teams on ERD program objectives. Specific actions recommended by the Committee (Appendix 1) are designed to strengthen the balance among Activity Set components in the intercountry program. Principal recommendations are summarized below.

Table 1. Status of Activity Sets, October 22, 1980

Activity Set Title and Code	Number of Country Projects and Proposals				Total
	Funded Work in Progress	Committed in Principle	Firm Proposal	Pre- Proposal	
	(A1)	(A2)	(B1)	(B2)	
I. Rural Development Objectives, Energy Needs Assessment, and Data Develop- ment	4	1	3	4	12
II. Biogas: Technology, Assessment, and So- cial Organization	3	3	3	5	14
III. Fuelwood: Technology, Assessment, and So- cial Organization	-	1	6	5	12
IV. Solar and Other Systems: Technology, Assessment, and So- cial Organization	2	-	4	10	16
TOTAL	9	5	16	24	54

Source: Appendix 1

B. Recommendations

1. Specific attention by proponents of country projects and proposals to meet the review standards, recommended actions, and datelines detailed in Appendix 1 is requested as essential to the cooperative effort.

2. The ERD Secretariat should maintain its emphasis on quality of detail and relevance in the formulation of project documents. It should continue its significant contribution with immediate attention to those Activity Sets and country research components not yet fully represented.

3. ERD Program endorsement for both UNIFSTD and IDRC proposals should be based on the following criteria:

- the proposal has been elaborated in a complete proposal format
- a copy of the letter of transmittal of the proposal is received by the Secretariat
- the proponents ask for ERD endorsement

4. The Committee endorses the following proposals and requests the Secretariat to prepare notice of these endorsements for appropriate funding agencies:

<u>Proposal</u>	<u>Funder</u>
THA-I-1 (Thailand)	UNIFSTD
THA-II-1 (Thailand)	UNIFSTD
THA-III-1 (Thailand)	UNIFSTD
THA-IV-1 (Thailand)	UNIFSTD
USA-II-1 (RSI)	UNICEF
IND-III-2 (India)	UNIFSTD

5. Reports prepared as products of the ERD Program should be actively identified with the intercountry effort. Specifically, RSI is requested to include the Program name and an appropriate project code in its current series or reports.

6. The Committee informed Dr. M. Nurul Islam of the value it attaches to his final draft report and requested that he send copies to ERD Steering and Research Committee members and Intercountry Activity Coordinators. This report contributes not only to research focus and methodology of Activity Set I but also to the integration of needs assessment with the technology concerns addressed in Activity Sets II, III, and IV.

II. REFINEMENT OF INTERCOUNTRY PROGRAM MANAGEMENT PLANS

The Research Committee reviewed and refined the intercountry program plans adopted by the Steering Committee at its July 1980 meeting in Honolulu. The results are summarized below under four principal modes of intercountry collaboration.

A. Workshops

The Research Committee evaluated the draft prospectus for each topic workshop commissioned by the Steering Committee in July. A statement of objectives, intended outputs, and Research Committee recommendations for workshop plan refinement is found in Appendices 3a-3d. Adjustments in workshop venues and dates were entertained and the following revised workshop schedule was adopted:

Table 2. ERD Workshops 1981

Activity Set	Title	Host Country/ Coordinator	Date/ Location
I	Policy Dimensions & Methods of Data Collection	Indonesia/ H. Soesastro	April 20-25, 1981/Jakarta
II	Economic and Social Aspects of Biogas Technologies and Systems	Nepal/ K. L. Shrestha	Oct. 26-29, 1981/Pokhra
III	Fixing Criteria for Mass Selection of Fuelwood Species	Philippines/ E. Reyes	Feb. 24-27, 1981/Los Banos
IV	Rural Energy Technology: Economic Assessment & Social Organization	Thailand/ K. Silapabanleng	May 11-14, 1981/Chiang Mai

B. Fellowships and Researcher Exchange

Prior to the Research Committee meeting, members assessed fellowship and researcher exchange requirements in ERD participating countries through March 1982. The Research Committee evaluated these projected requirements against available resources and fixed the starting time, duration, and location for each proposed assignment. The distribution of fellowships allocated to each Activity Set is summarized in Table 3.

Table 3. Fellowships and Research Exchanges (to March 31, 1982).

Country	Activity Set I		Activity Set II		Activity Set III		Activity Set IV		Total fellow months
	person months	starting/ location	person months	starting/ location	person months	starting/ location	person months	starting/ location	
Bangladesh	*	*	*	*	*	*	*	*	*
India	6	01/81 RSI	4	06/81 PHI, USA	-	-	4	07/81 AUS, JAPAN, FRANCE	14
Indonesia	6	04/81	-	-	-	-	-	-	6
Nepal	6	03/81 RSI	3	01/81 IND	3	04/81 INA, PHI	5	06/81 AUS, THA, IND, EUROPE	17
Philippines	-	-	-	-	2	04/81 RSI	-	-	2
Sri Lanka	*	*	*	*	*	*	*	*	*
Thailand	4	06/81 RSI	5	03/81 PHI, JND, USA	3	04/81 INA, PHI	3	05/81 INA, PHI, AUS	15
USA/RSI	8 3	10/80 03/81	2	02/81 IND, SRI	5	05/81	-	-	18
Total fellow months	33		14		13		12		72

*To be determined.

C. Study Tours

The Committee assessed the prospect of Study Tours through the end of March 1982 and concluded it would be advantageous to mount an inter-country study tour in conjunction with the Biogas Workshop scheduled for October in Nepal. Research Committee member Shahzad Bahadur agreed to develop a study tour prospectus tentatively scheduled for October 5-23, 1981 to visit biogas research centers and installation sites in India, Nepal, China, and the Philippines. The Committee requested Intercountry Coordinators for the remaining Activity Sets to evaluate the need for study tours and present their recommendations to the respective workshops.

D. Research Interns

In order to help create a new generation of research workers trained in the energy problems of rural areas, the Research Committee anticipated the need for several research internships per year for directed research at RSI or a cooperating ERD institution. The Committee requests country coordinators to determine the need and forward their findings to the Chairman of the Research Committee.

III. INTERCOUNTRY PROGRAM BUDGETS

A consolidated ERD Program budget was prepared based on funding requirements for all intercountry research and support activities proposed by the Research Committee for periods corresponding to 1) the final period of the current AID grant to RSI, and 2) the first year of a proposed three year continuation of the AID grant.

Table 4 summarizes the total intercountry budget requirement for these periods. Itemized budgets corresponding to these requirements are given in Appendix 4.

Table 4. Consolidated Budget
Through March 31, 1982

Budget Period	Budget Total
1. 10/1/80 - 3/31/81	\$117,500
2. 4/1/81 - 3/31/82	\$248,700
TOTAL	\$366,200

IV. PROJECTION AND INTEGRATION OF FORWARD PROGRAM (PRODUCTS AND BENEFITS)

The Research Committee discussed the possible longer term evolution of the ERD Program in order to provide recommendations to the Steering Committee and also to guide formulation of the RSI/ERD presentation to USAID for extension and expansion of the present grant.

A. Research Directions

The Committee was emphatic that the ERD Program should concentrate its energies on directions first outlined at the February 1980 Chiang Mai meeting and consolidated at the July 1980 Honolulu meeting. It suggested that no major changes, substitutions, or additions be made until at least three regional workshops have been held. Products and assessments from workshops on Activity Sets I, III, and IV will be available in June 1981. With this in view, the Committee suggested that the next meeting of the Steering and Research Committees might appropriately be held to coincide with the United Nations Conference on New and Renewable Sources of Energy (UNCNRSE) in Nairobi in August 1981. At this time, preliminary or revised reports on ERD work in progress will also be in hand and several more research projects should have been started.

In line with this concentration of efforts, further suggestions were:

1. Emphasize the meaning of the Program for rural people by strengthening field implementation directions. Implementation successes of rural energy technologies within the region should be explored for wider application.
2. Work to develop concrete facts and analyses targeted to specific government concerns. Also, develop and apply techniques for making policy recommendations in the absence of complete information, but with a view toward the likely schedule of availability (decision making under uncertainty).
3. Consider interaction of conventional and renewable/traditional energy systems in rural areas, especially with regard to the middle distillates (kerosene and diesel fuel).
4. Strengthen ERD researcher exchanges to provide for collaborative data analysis and joint authorship of research products, thereby serving to compare and integrate findings from different types of rural setting.

B. RSI/ERD Presentation to USAID

A draft outline was prepared for presentation of the forward ERL Program by RSI to AID (Appendix 5). The presentation is to be based on purposes, goals, and content of current Program documents. It will undertake to show benefits of the Program as perceived by participating countries as well as from the standpoint of AID. A preliminary integration of program components will be projected over the next three years to achievement of ERD products and benefits.

The Committee endorsed the outline presentation and gave consideration to the identification of benefits and interactive approaches.

C. Intercountry Program Benefits

Countries participating in the ERD Program seek guidelines, recommendations, and methodologies that will enable each country to improve its understanding of policies, methods, and applications through which various energy sources and technologies can be used for more effective and equitable rural development. Such is the ultimate objective of the intercountry Program. Its spectrum of projects is broadly representative of these needs as perceived by the participating countries at this time.

ERD member countries and institutions benefit from these objectives through participation in activities and services which include:

- Refinement, strengthening, and formatting of research projects and proposals.
- An information-sharing network which includes methods, experiences, implementation techniques, and current reference materials.
- Fellowships and researcher exchange to help sharpen research capabilities through participation in new analyses of ERD issues.

It is anticipated that towards the completion of the ERD Intercountry Program in 1983-1984 each member country will experience its benefits through greatly improved understanding of:

- a. existing energy flow patterns in rural areas;
- b. the relationship of these patterns to rural productivity and equity;
- c. changes that appear feasible, socially and technologically;
- d. methods for assessing these changes; and
- e. ways and means of instituting those changes that are found to be advantageous.

D. Preliminary Integration of Activity Sets toward ERD Program Products and Results

A preliminary outline was developed for a matrix showing how Program components in the technology-focused Activity Sets (II, III, IV) intersect with those in the need-oriented Activity Set (I) toward attainment

of ERD products and results. Such a matrix would be directed to Program products that serve the needs of end-users and decisionmakers. Specified products are:

- o Improved, assessed, and tested technologies for rural producers, families, and communities.
- o Guidelines to member countries on appropriate energy mixes for different rural settings. Guidelines will be formulated on:
 - viability and comparative advantages of specific energy technologies for specific end-uses/sectors;
 - influence of rural incomes and development objectives on energy choices;
 - substitution for nonrenewable sources;
 - investment allocations to research and development; and
 - technology organization and development policies.

The Committee endorsed this formulation of ERD Program products and the concept and structure of a matrix of Activity Set research components. Detailed specification of the matrix and its transformation into a PERT diagram were recommended by the Committee as a planning and management instrument for the Program.

V. PROGRAM DIRECTIONS AND COORDINATION AND SUPPORT FUNCTIONS

A. Research Committee Membership

1. The Research Committee recommended that members serve two year terms. The Committee would strive to maintain continuity in membership through overlapping appointments.
2. In order to insure adequate planning and informational inputs, the Committee recommended:
 - a. including all Intercountry Activity Coordinators (IACs) on the Research Committee, and
 - b. authority to draft, as appropriate, individuals from the ERD Program membership to undertake specific tasks on behalf of the Committee on an ad hoc basis.
3. The Committee recommended that Dr. Kirk Smith, USA member-designate to the Steering Committee, be included as a Research Committee member. Dr. Hadi Soesastro, Activity I Intercountry Activity Coordinator, was recommended for appointment to the Research Committee pursuant to recommendation 2a above.

4. The Research Committee as reconstituted would include:

Dr. Artono Arismunandar, Chairman (to 3/82)
 Mr. Shahzad Bahadur, IAC-II (to 7/82)
 Dr. Kulthorn Silapabanleng, IAC-IV (to 3/82)
 Mr. Richard Morse (to 3/82)
 Dr. Edilberto Reyes, IAC-III (to 3/82)
 Dr. A.H. Shahadatullah (to 7/82)
 Dr. Kirk Smith (to 10/82)
 Dr. Hadi Soesastro, IAC-I (to 10/82)

B. Operations and Management

The Committee adopted the following principles to guide operations and management aspects of the ERD Program:

1. Continue to define and categorize researcher exchange requirements and selection procedures;
2. Elaborate the characteristics defining ERD membership including the benefits and responsibilities of member institutions and the Secretariat;
3. Develop monitoring and internal evaluation procedures for ERD;
4. Seek connections in the wider energy and rural development communities regionally and globally;
5. Encourage the inclusion of young researchers in all ERD activities in order to help create a new generation of trained and focused workers;
6. Consider the establishment of an ERD energy consultancy operating at cost to provide assistance to local, national, and international decisionmakers.

C. ERD Publication Policy

1. The Research Committee agreed that an identifiable body of publications related to the ERD Program should be promoted. This effort should include:
 - a. publications issuing from ERD intercountry topic workshops and study tours;
 - b. abstracts and annotated bibliographies of ongoing ERD research and available documentation;
 - c. a series of research monographs, handbooks, and pamphlets to move ERD results into the professional and policy communities;

- d. bulletins and/or a newsletter on the progress of ongoing ERD-related research;
 - e. an updatable research directory/inventory of current ERD associated country projects and proposals, and ERD researchers; and
 - f. consideration of joint publication of nontechnical, semi-popular books with a commercial publisher to heighten public and decisionmaker awareness of energy and rural development issues.
2. The Committee asked the ERD Secretariat to draft the following documents for the Steering Committee consideration before December 31, 1980:
- a. a statement of ERD Program objectives and scope for inclusion in all ERD-associated published documents,
 - b. guidelines for uniform coding/numbering/indexing of ERD-associated publications disseminated by member institutions, and
 - c. ERD publication guidelines and style specification manual.

D. Information Exchange

The Research Committee emphasized the importance of normalizing the ERD information network for acquisition and diffusion of research results, analysis, and data. Priority areas for information network development include:

1. Development of an ERDINET bibliography service, emphasizing information on hardware development.
2. Production of an ERD bulletin/newsletter and directory.
3. Access to existing information exchange services in the region through subscription and/or purchase of services targeted to the needs of ERD-associated research teams. Plans should be made immediately by the Secretariat to explore linkages with:
 - Regional Center for Technology Transfer (RCTT), Bangalore
 - Renewable Energy Resources Information Center (RERIC), Asian Institute of Technology, Bangkok
 - Tata Energy Research Institute (TERI), Bombay
 - Volunteers in Technical Assistance (VITA), Asia Field Office, Bangkok

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APPENDICES

Project/ proposal code	Project/proposal title	Review	Status*	Recommended action	Dateline
BAN-I-1	<u>Rural Energy Survey</u>	Proposal forthcoming.	B2	ERD Secretariat followup with SC member, possibly by personal visit.	ASAP
IND-I-1	<u>A Study of Energy Systems in Rural Uttar Pradesh</u>	Proposal meets minimum ERD format requirements; proposal requires <u>no</u> external funding; work underway (pre-test design); requires ERD fellowships 6mm beginning Jan. 1981.	B1	Budget not included, submit to ERD Secretariat by dateline; requires new abstract; substitute new title on ERD project inventory.	Dec. 15, 1980
IND-I-2	<u>Rural Energy Demand and Supply Database Development</u>	Proposal under preparation; country funding component firm.	B1	Proposal to ERD Secretariat upon completion; proponent submits through official channels to IDRC; notify ERD Secretariat for endorsement.	Dec. 15, 1980
IND-I-3	<u>Planning for Energy Needs in Rural Areas</u>	Project document under preparation; no external funding required; principal proponent out of country.	A2	Continue ERD association for present; to send descriptions to ERD Secretariat within one month.	Dec. 1, 1980
INA-I-1	<u>Rural Development Objectives and Assessment of Energy Needs</u>	Requires elaboration of methodology; needs statement of staff qualifications; activity sequence and budget not compatible (why external travel, large funding requirement for data collection in year 2); high external funding ratio for salaries; elaborate use of training component.	B2	Reformat and submit to UNIFSTD for funding as country project; notify ERD for endorsement.	Dec. 15, 1980
INA-I-2	<u>Data for Current Policy Analysis</u>	Work in progress. Will be reported at Activity Set Workshop 1.	A1	Monitor.	--
NEP-I-1	<u>Rural Development Objectives and Assessment of Energy Needs and Viable Technologies</u>	Proposal forthcoming.	B2	Proposal will be submitted to Secretariat by timeline.	Dec. 15, 1980
PHI-I-1	<u>Database and Energy Needs Assessment</u>	Merger of two projects not accomplished to date; final proposal to UNIFSTD.	B2	Need Status Report from Philippines SC member; UNIFSTD requires proposal by December 1980.	ASAP
SRI-I-1	<u>Development of Rural Energy Demand and Supply Database</u>	Work in progress; status unknown.	A1	ERD Secretariat contact SC member, possibly by personal visit.	ASAP
THA-I-1	<u>Rural Dev. Policy, Energy Needs, Data Requirements, and Viability Assessment</u>	Proposal formatted for UNIFSTD, already submitted through Thai government to UNIFSTD; fellowship requirement: 4mm/ERD, 3mm/UNIFSTD; new title; new budget.	B1	Chairman Research Committee write UNIFSTD to endorse project.	ASAP
USA-I-1	<u>Rural Dev. Objectives and Assessment of Energy Needs</u>	Interim products submitted: RSI-PR-80-1 and RSI-PR-80-2.	A1	--	--
USA-I-2	<u>Rural Development Energy Data Requirements</u>	Interim product submitted: RSI-PR-80-3.	A1	--	--

Project/ proposal code	Project/proposal title	Review	Status*	Recommended Action	Dateline
BAN-II-1	<u>Technologies: Biogas</u>	Inconsistency in activity sequence and budget; need more detail in objectives.	B2	Reformulate in UNIFSTD format and resubmit to ERD Secretariat for review.	Dec. 15, 1980
IND-II-1	<u>Socio-Technical Aspects of Community-Type Biogas Plants</u>	Government approval firm; no external funds required.	A1	Proposal will be submitted to ERD Secretariat by dateline.	Dec. 15, 1980
IND-II-2	<u>PRAD Projects on Biogas</u>	Now internally funded; remove from UNIFSTD plan; merger of three sub-projects.	I2	Proposal will be submitted to ERD Secretariat by dateline.	Dec. 15, 1980
IND-II-3	<u>Integrated Farming cum Energy Systems</u>	Status unknown.	B2	Bahadur to report on status to ERD Secretariat by timeline.	Dec. 1, 1980
IND-II-4	<u>Cost-Benefit Studies on Biogas Plants</u>	Government approved project.	A2	Project to ERD Secretariat by timeline.	Dec. 15, 1980
IND-II-5	<u>Village Social Structure: Biogas</u>	New title; need budget.	A2	Proposal to ERD Secretariat by timeline.	Dec. 26, 1980
INA-II-1	<u>Technologies and Systems: Biogas</u>	Firm, funded and work in progress.	A1	Report on progress at AS II workshop.	Oct. 26, 1981
NEP-II-1	<u>'Survey of Biogas Potential and Scope'</u>	Proposal forthcoming.	B2	Proposal to ERD Secretariat.	Dec. 15, 1980
NEP-II-2		No proposal; topics: 1) cost reduction, 2) use of digester sludge, 3) improving viability of feedstock, 4) low-temperature biogas plants.	B2	Proposal to ERD Secretariat.	Dec. 15, 1980
PHI-II-1	<u>Biogas from Agro-Industrial Residues</u>	Internal funded component underway.	B1	Status report from SC member.	Dec. 15, 1980
SRI-II-1	<u>Biogas for Rural Households and Farms</u>	Unknown.	B2	Report from SC member.	ASAP
THA-II-1	<u>Biogas: Tech., Assessment and Popularization</u>	<u>Microbiology:</u> no mention of effects of temperature <u>Cost reduction:</u> \$200/family appears high. <u>Diversification:</u> consider size of land and cattle holdings <u>Integrated systems:</u> add irrigation <u>Popularization:</u> effects on women and leisure activities	B1	Submitted to UNIFSTD; RC chairman send endorsement to UNIFSTD.	ASAP
USA-II-1	<u>Chinese Biogas Manuals Translation</u>	Substitution project; new proposal; new title.	B1	Requests RC endorsement to UNICEF.	ASAP
USA-II-2	<u>Viability Assessment</u>	Interim products submitted: RSI-PR-80-4 and RSI-PR-80-5.	A1	--	--

Project/ proposal code	Project/proposal title	Review	Status*	Recommended action	Dateline
BAN-III-1	<u>Experimental Fuelwood Plantation</u>	Pre-proposal; proponent expects RSI to fund - need to clarify this; integrate study tour into UNIFSTD format; fellowship requirement.	B2	Return for improvement based on ERD Proposal Guidelines; reformat for UNIFSTD.	Dec. 15, 1980
IND-III-1	<u>Fuelwood Plantation Studies</u>	Status uncertain; no external funds required.	A2	Submit proposal to ERD Secretariat by dateline.	Dec. 15, 1980
IND-III-2	<u>Energy Cum Fuel and Fodder Plantation</u>	New title new funding requirement (\$385,440. include in-country funding - should be 75% external; submitted to UNIFSTD Aug 1.	B1	SC Chairman send endorsement to UNIFSTD.	ASAP
NEP-III-1	<u>Integrated Development on Mini-Catchment Basis</u>	Received at RC meeting.	B1	Proposal with some modifications to ERD Secretariat.	Dec. 15, 1980
NEP-III-3	<u>Improved Stoves and Pyrolysis</u>	Proposal forthcoming.	B2	Proposal to ERD Secretariat.	Dec. 15, 1980
PHI-III-1	<u>Seed Collection, Storage and Production</u>	Needs country endorsement; ready for UNIFSTD submission.	B1	Notify ERD Secretariat when proposal sent to UNIFSTD; SC Chairman to endorse.	--
PHI-III-2	<u>Cooking Stoves Using Agro-Forestry Wastes</u>	Proposal under preparation.	B1	Submit proposal to ERD Secretariat.	Dec. 15, 1980
SRI-III-1	<u>Forestry and Environment</u>	Uncertain.	B2	SC member report to Secretariat on status.	ASAP
SRI-III-2	<u>Fuelwood Efficient Domestic Cooker</u>	Uncertain.	B2	SC member report to Secretariat on status.	ASAP
THA-III-1	<u>Wood Energy Assessment of Potential for Energy Plantation</u>	New title; new co-sponsor; new budget; submitted to UNIFSTD.	B1	RC Chairman send endorsement to UNIFSTD.	ASAP
USA-III-1	<u>Fuelwood Technologies: Social of Health Impacts of Alternative Combustion Techniques</u>	New proposal; in conjunction with UC Berkeley.	B2	Submit proposal to ERD Secretariat.	Dec. 15, 1980
USA-III-2	<u>Biomass Potential as an Energy Source for Rural Development</u>	Submitted to several funders.	B1	Monitor.	--

Project/ proposal code	Project/proposal title	Review	Status*	Recommended action	Dateline
BAN-IV-1	<u>Technologies and Systems: Solar, Hydro, Wind and Energy Mixes</u>	Return to proponent; too ambitious scope; perhaps activities on steam generation and thermocouples should be dropped; emphasize focus on rural technologies; no assessment dimension; no social organization dimension (see Honolulu SC plan); proponent should expand scope of interinstitutional coop.	B2	Return to proponent for revision and resubmission to RC.	Jan. 15, 1981
IND-IV-1	<u>Solar Energy for Rural Development in India</u>	Status unknown.	B2	Report from SC member (or Bahadur).	Dec. 15, 1980
IND-IV-2	<u>Photovoltaic Solar Electrical Power Systems for Rural Development</u>	Status unknown.	A1	Report from SC member (or Bahadur).	Dec. 15, 1980
IND-IV-3	<u>Use of Solar Panels for Irrigation Pumping with Conjunctive Biogas Use</u>	Proposal needs reformatting for UNIFSTD.	B1	Proposal to ERD Secretariat by timeline; submit directly through government channels for UNIFSTD; ERD endorsement.	Dec. 15, 1980
NEP-IV-1	<u>'Solar Grain Dryers'</u>	Under preparation; needs fellowships (3mm).	B2	Submit proposal to ERD Secretariat.	ASAP
NEP-IV-2	<u>'Microhydro'</u>	Under preparation; needs fellowships (2mm).	B2	Submit proposal to ERD Secretariat.	ASAP
PHI-IV-1	<u>Typological Studies of Village Social Structure</u>	Proposal under revision.	B1	Proponents submit proposal directly to IDRC by dateline and notify ERD Secretariat for endorsement.	Dec. 1, 1980
PHI-IV-2	<u>Case Studies of Village, Regional and National Institutions</u>	Proposal under revision.	B1	Proponents submit proposal directly to IDRC by dateline and notify ERD Secretariat for endorsement.	Dec. 1, 1980
SRI-IV-1 to SRI-IV-5	--	Status unknown.	B2	Report from SC member on status.	Dec. 15, 1980
THA-IV-1	<u>Dev., Intro., and Commercialization of Solar Cookers, Water Heaters and Grain Dryers</u>	Proposal formatted for UNIFSTD; fellowship requirements: 3mm (India, Philippines, Australia); new title; new budget.	B1	Chairman Research Committee write UNIFSTD with endorsement.	ASAP
THA-IV-2	<u>Viability, Economic and Social Assessment</u>	Proposal under preparation.	B2	To be submitted to IDRC by dateline; endorsement from ERD program.	Dec. 1, 1980
USA-IV-1	<u>Technologies: Solar, Hydro, Wind and Mixes</u>	Interim products submitted: ESI-PR-80-7 and RSI-PR-80-8.	A1	--	--

*A1 - Funded/Work in Progress
 A2 - Funded or Committed in Principle
 B1 - Firm Proposal
 B2 - Pre-Proposal

Appendix 2. Energy for Rural Development Program Reports

September 1980

- ERD I-80-1
USA I-1 ASSESSING ALTERNATIVE RESOURCES, TECHNOLOGIES, AND ORGANIZATIONAL MEANS FOR MEETING RURAL ENERGY NEEDS
RSI Program Report PR-80-1
Richard Morse and Fereidun Fesharaki
- ERD I-80-2
USA I-2/INA I-2 ENERGY ANALYSIS IN RURAL REGIONS: STUDIES IN INDONESIA, NEPAL, AND THE PHILIPPINES
RSI Program Report PR-80-2
Raymond Atje, Deepak Bajracharya, Deanna G. Donovan, Bruce Koppel, James Tarrant
- ERD I-80-3
USA I-2 THINKING ABOUT ENERGY AND RURAL DEVELOPMENT: METHODOLOGICAL GUIDELINES FOR SOCIOECONOMIC ASSESSMENT
RSI Program Report PR-80-3
Charles C. Schlegel and James Tarrant
- ERD II-80-1
USA II-2 CRITERIA FOR EVALUATING SMALL-SCALE RURAL ENERGY TECHNOLOGIES: THE FLERT APPROACH (Fuel-Linked Energy Resources and Tasks)
RSI Program Report PR-80-4
Kirk R. Smith and Michael T. Santerre
- ERD II-80-2
USA II-2 APPLICATION OF THE FUEL-LINKED RESOURCES AND TASKS (FLERT) APPROACH TO RURAL HOUSEHOLD AND COMMUNITY SCALE ANAEROBIC DIGESTION SYSTEMS
RSI Program Report PR-80-5
Michael T. Santerre and Kirk R. Smith
- ERD IV-80-1
USA IV-1 SOLAR ICEMAKERS FOR RURAL DEVELOPMENT: TECHNICAL PROSPECTS
RSI Program Report PR-80-7
David T. Isaak
- ERD IV-80-2
USA IV-1 CASE HISTORIES OF ENERGY PROJECTS FOR RURAL DEVELOPMENT
RSI Program Report PR-80-8
Louis J. Goodman, Ralph N. Love, John M. Hawkins, Tetsuo Miyabara

An additional program document (generated by Activity BAN I-0) was forwarded to Pattaya for the information of the Research Committee. This report is titled STUDY OF THE PROBLEMS AND PROSPECTS OF BIOGAS TECHNOLOGY AS A MECHANISM FOR RURAL DEVELOPMENT STUDY IN A PILOT AREA OF BANGLADESH. Its author is Dr. M. N. Islam of the Bangladesh University of Engineering and Technology in Dacca.

Appendix 2. (continued)

Research Materials:

- | | |
|-------------------------|--|
| ERD RM 80-1
USA I-2 | THESAURUS FOR ENERGY AND RURAL DEVELOPMENT
RSI Research Materials RM-80-1
Diane M. Pruett and Ted S. Toyoshiba |
| ERD RM-80-2
USA II-2 | BIBLIOGRAPHY ON ANAEROBIC DIGESTION
RSI Research Materials RM-80-4
Jamuna Ramakrishna |
| ERD RM-80-3
USA IV-1 | SOLAR ICEMAKERS: A BIBLIOGRAPHY WITH ABSTRACTS
RSI Research Materials RM-80-5
Jean A. Brady and David T. Isaak |

Appendix 3a. ERD Workshop Planning: Activity Set I

TITLE: Policy Dimensions and Methods of Data Collection

Date & Location: April 20-25, 1981, Jakarta, Indonesia

Objectives: This workshop has two main aims:

(1) to enhance understanding and increased sensitivity to the scope of policy issues in the field of energy and rural development planning; and (2) to improve capabilities to systematically collect relevant and current data or information in support of the first-mentioned aim.

Topic:

1. Felt needs assessment: (a) policy dimensions, (b) identification of relevant research.
 2. The role of energy for rural development: (a) evidence of the importance of energy in rural development, (b) methods for assessing the role of energy in rural development, (c) gaps in understanding the role of energy in rural development.
 3. Rural energy flow patterns: (a) main areas of consideration in rural energy policy formulation, (b) data collection modes.
 4. Data collection and organization: (a) ways and means to improve data collection, (b) items to be incorporated into rural energy surveys, (c) costs and benefits of various survey methods.
 5. Methodology handbook: (a) prospects and problems in the development of a handbook, (b) other training and institutional materials and approaches.
 6. Guidelines for future incountry research.
 7. Operational plans and guidelines for intercountry research.
- Outputs:
1. Papers on improved comparative research design.
 2. Guidelines for rural energy policy formulation.
 3. Guidelines for constructing a rural energy database.

Appendix 3a. (continued)

4. Reports on methods and experiences in rural data collection.
5. Guidelines for future intercountry research.

Research Committee

- Recommendations:
1. More emphasis might be given to data collection and organization topics.
 2. The planned 4-day agenda extended to 5 to allow coverage of policy issues and felt needs topics while strengthening data collection and organization topics.
 3. Consider inviting experts from outside ERD network.
 4. Include development of recommendations or procedures for gathering energy statistics as an output.
 5. Include in the planning schedule a specific deadline for receipt of papers prior to the workshop.
 6. Incorporate a training dimension in site visits.
 7. More time should be allowed included in the workshop agenda for discussion periods.
 8. Recommend the secondment of RSI fellow Charles Schlegel to assist during preparations for workshop.

Appendix 3b. ERD Workshop Planning: Activity Set II

Title: Workshop on Economic and Social Aspects of Biogas Systems

Dates & Location: October 26-29, 1981, Pokhara, Nepal

Objectives: To gain understanding of the present and possible future roles of biogas in rural development; to exchange information regarding experience of different countries with respect to cost reduction and social acceptability of biogas systems; to address gaps in information and enable specific and concrete plans to be drawn up for multi-country research work in areas where it could complement and act in concert with national and local research.

- Topics:
1. Status papers on: (a) technical aspects of biogas digesters adopted, common feedstock materials, and technological problems encountered in construction and maintenance of digesters, distribution systems, and accessories; (b) cost-benefit considerations for families and communities adopting biogas systems; (c) experience regarding extension methodology; and (d) technical, economic, and social constraints in wider adoption of biogas systems.
 2. Cost reduction methodologies: (a) for family size digesters up to 10 cubic meters; (b) for larger biogas systems above 10 cubic meters for institutions and communities; (c) distribution systems; and (d) burners, lamps, and other biogas consuming equipment.
 3. Alternative feedstock materials including: (a) comparative analysis of biogas generation per unit with alternative feed materials and mixed feeds; and (b) alternative uses in the rural economy of proposed feed materials for biogas plants, and economics of substitution.
 4. Use of digester slurry as fertilizer including: (a) comparative efficiencies of traditional composting and of biogas slurry application to field in terms of nitrogen delivery; (b) economic factors affecting suitable mixes of chemical fertilizers and biogas slurry; and (c) pathogenic aspects of slurry application.
 5. Effects of temperature variations including: (a) quantitative analysis of effects of temperature variation on biogas generation; and (b) low-cost devices for maintaining stable slurry temperature.
 6. Technical and economic factors affecting use of biogas for running internal combustion engines, stationary engines, vehicles, and tractors.

Appendix 3b. (continued)

7. Integrated farming systems based on use of biogas, solar, and wind technologies.
8. Use of large biogas plants for communities and institutions: (a) economics of use; (b) problems of public participation in rural communities; and (c) alternative gas utilization budgets for commercial and noncommercial uses.
9. Cost benefit analysis of family, institutional, and community biogas systems; necessity for and role of government subsidies.
10. Social acceptability of biogas systems: (a) extension methods for effecting change; (b) role of local opinion leaders in rural societies; and (c) role of policy directives from government.

Outputs:

1. Report of the workshop.
2. Identification of priority areas for research work to be done in different participating countries and possibilities of intercountry research in various fields listed under "Topics."
3. Framing of research proposals for presentation to Steering Committee and funding agencies.

Research Committee

- Recommendations:
1. A planning schedule for paper submissions and travel arrangements should be included in the workshop prospectus.
 2. Selection criteria and the number of participants should be added to the prospectus.
 3. Activity schedule should be more detailed.
 4. Call for papers should be scheduled to allow submission in advance of workshop.
 5. Revise content of workshop to limit scope and number of topics covered.
 6. Emphasis might be on cost-reduction or comparisons between community and commercial farm scales.
 7. Four days seem adequate for a tightly scoped workshop.

Appendix 3c. ERD Workshop Planning: Activity Set III

Title: Fixing Criteria for Mass Selection of Fuelwood Species

Date & Location: February 24-27, 1981, Los Banos, Philippines

Objectives: The general objective of the workshop is to establish appropriate or standard criteria for the mass selection of fuelwood species for a set of agroclimatic conditions. To do this it will be necessary to formulate a practical and standard method of determining or fixing each criterion.

Topics:

1. Technical considerations: (a) methods of determining site suitability (site adaptability) as a basis for mass selection of fuelwood species; (b) regeneration and cultural management methods; (c) techniques of evaluating growth and yield; (d) techniques of harvesting and hauling; and (e) techniques of determining wood properties and heating values.
2. Economic considerations. Economic criteria and the methods of their assessments will also be used as a basis for the mass selection of fuelwood species.
3. Social considerations. To be discussed are the social factors that might be used as a basis for mass selection of fuelwood species, and methods for their evaluation.

Outputs:

1. Guidelines for determining appropriate mass selection of fuelwood/charcoal producing tree species.
2. Research papers on a range of technical and socio-economic topics relevant to policy considerations. These papers might be carefully edited to provide a volume with wide application in the region.

Research Committee

Recommendations:

1. Reevaluate topic outlines for country papers to insure substantive content. Otherwise country papers might be too general.
2. Plan under review leaves too much substantive responsibility to Philippines papers.
3. Clarify relationship between country papers and topic papers.
4. Participant selection criteria should be clarified.

Appendix 3d. ERD Workshop Planning: Activity Set IV

Title: Rural Energy Technology: Economic Assessment and Social Organization

Date & Location: May 11-14, 1981, Chiang Mai, Thailand

Objectives:

1. To gain latest information on the status of rural energy technology in member countries of the ERD program with a view to assess and identify specific areas in which additional hardware development is required.
2. To enhance understanding of socioeconomic determinants of rural energy demands.
3. To review and if necessary modify Activity Set IV research plans and study visits.

Topics:

1. Status of rural energy technologies in ERD member countries.
2. Design and feasibility studies of rural energy technology mixes.
3. Socioeconomic determinants for fitting available technologies to existing rural energy demand patterns.
4. Ecological, environmental, and institutional aspects of rural energy technology introduction.

Outputs:

1. Guidelines for member countries on appropriate energy mixes for different rural settings.
2. Guidelines for socioeconomic assessment techniques for rural energy technology.

Research Committee

Recommendations:

1. Too much emphasis on rural policy issues. Re-scope prospectus to emphasize technologies.
2. Include field visits to appropriate technology research, development, and implementation sites.

Appendix 4. Intercountry Program Budgets

	(A)	(B)	
	10/01/80 to 03/31/81	04/01/81 to 03/31/82	TOTAL
	(US\$)	(US\$)	(US\$)
1. Fellows, study tours, workshops, research interns (details in Attachment 1)	93,940	181,540	275,480
2. Research Committee/ Steering Committee meetings (Attachment 2)	9,000 (Pattaya)	24,000 (Nairobi)	33,000
3. ERD Secretariat support (Attachment 2)	6,000	12,000	18,000
4. ERD Secretariat travel-- one trip Asia, one trip Honolulu (Attachment 2)	2,560 Asia	3,160 Hnl	5,720
5. Information exchange	3,000	10,000	13,000
6. Administrative support for country coordinators (Attachment 2)	3,000	6,000	9,000
7. Publications and editing		12,000	12,000
TOTAL	117,500	248,700	366,200

Appendix 4. (Attachment 1)

(10/01/80 to 03/31/81)

Activity Set	Fellows		Study Tour US\$	Workshop US\$	Total US\$
	person- months	US\$			
I	17	53,940	-	-	53,940
II	7	21,000	-	-	21,000
III	-	-	-	19,000	19,000
IV	-	-	-	-	-
Total	18	74,940	-	19,000	93,940

(04/01/81 to 03/31/82)

I	8	19,200	-	19,000	38,200
II	8	17,200	17,370	19,000	53,570
III	8	17,200	-	-	17,200
IV	12	35,200	-	19,000	54,200
Total	36	88,800	35,740*	57,000	181,540*

*Includes undesignated funds for one additional study tour (\$17,370) during budget period.

Appendix 4. (Attachment 2)

August 1981 Research/Steering Committee
Meeting (8 persons)

1.	International (8 x 2,000)	\$16,000	
2.	Per diem (8 x 10 x 50)	4,000	
3.	Communication	800	
4.	Clerical assistance	600	
5.	Xeroxing	600	
6.	Publications	2,000	<u>\$24,000</u>

ERD Secretariat

Coordination \$1,000/month

ERD Secretariat Travel

Regional	- travel	\$1,000	
	- per diem (\$60 x 21)	1,260	
	- contingencies	300	<u>\$2,560</u>
To Honolulu	- travel	\$1,600	
	- per diem (\$60 x 21)	1,260	
	- contingencies	300	<u>\$3,160</u>

Administrative support: \$1,000/year for each country (6)

Appendix 5. Draft Outline of RSI/ERD Presentation
to USAID, November 1980

Introduction

- A. Purpose and Goals
- B. Status to Date

II. Forward Planning

- A. Current Schedule of Activities
- B. Expected Project Evolution

III. Intended outputs

- A. Incountry Proposals/Projects
- B. Research Reports

IV. Benefits

- A. Individual Countries
 - Present
 - Expected
- B. USAID

V. Integration of Three-year Plan

VI. Appendices

- A. Workshop/Study Tour Plans
- B. Fellow Exchange Plans
- C. Information Exchange Program
- D. Publication and Dissemination

Appendix 6. ERD Research Committee Meeting, Pattaya, Thailand
October 20-22, 1980

Agenda

Monday October 20

- 10:00 - 12:30 : Discussion of Activity Sets I and II
- a. Status of related country projects and proposals
 - b. Workshop prospectuses
 - c. Fellowships
- 12:30 - 1:45 : Lunch
- 1:45 - 3:34 : Discussion of Activity Sets III and IV
- 3:45 - 4:15 : Coffee break
- 4:15 - 5:15 : Evaluation of readiness of Activity Sets
- 5:15 - 6:15 : Discussion of funding and program development strategy
- a. Incountry funding
 - b. RSI/AID funding
 - now until April 1, 1981
 - extension of AID funding
 - c. IDRC funding
 - d. UNIFSTD
 - e. Others
- 7:30 - 9:30 : Dinner
- Reception

Tuesday October 21

- Before 10:00 a.m. : Read country proposals
- 10:00 - 12:00 :
 - a. Evaluation of proposals in-hand
 - b. Recommendations for action on proposals
- 12:00 - 1:00 : Lunch

Appendix 6. (continued)

1:00 - 3:00	:	Detailing of immediate plan until April 1981 on:
		<ul style="list-style-type: none"> a. Workshops b. Fellowships c. Study tours
3:00 - 3:30	:	Coffee break
3:30 - 5:00	:	Program content for the next 2-3 years
 <u>Wednesday October 22</u>		
8:30 - 12:00	:	Continue outlining forward planning of program content
		<ul style="list-style-type: none"> a. Elaboration of forward planning b. Draft Research Committee recommendations c. Expansion of Research Committee d. Specification of criteria for ERD program association e. Communication and information exchange
12:00 noon	:	Adjourn

Appendix 6. (Attachment 1)

Participants

Dr. Artono ARISMUNANDAR, Chairman Director for Energy Resources Development Directorate General of Power Ministry of Mines and Energy Jalan Thamrin 12 Jakarta Pusat, Indonesia	Mr. Fredrich BURLIAN ERD Consultant Resource Systems Institute
Dr. Sanga SABHASRI (Chairman, ERD Steering Committee) Secretary-General National Research Council Phaholyothin Road Bangkok, Thailand	Mrs. Kajorn HOWARD Program Officer Resource Systems Institute
Dr. Kirk R. SMITH (Energy Project Leader) Research Associate Resource Systems Institute	Mr. Richard MORSE Research Associate Resource Systems Institute
Dr. Woraphat ARTHAYUKTI Assistant Professor Faculty of Engineering Chulalongkorn University Bangkok 5, Thailand	Dr. Edilberto REYES Director of Research University of the Philippines at Los Banos Laguna, Philippines
Mr. Shahzad BAHADUR Director, Planning Research and Action Division State Planning Institute Kalakankar House Lucknow, India	Dr. Kedar L. SHRESTHA Executive Director Research Center for Applied Science and Technology Tribhuvan University Kirtipur, Kathmandu, Nepal
	Dr. Kulthorn SILAPABANLENG Associate Professor Faculty of Engineering Chulalongkorn University Bangkok 5, Thailand

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Bangkok 9, Thailand

Miss Pratoom ROENGSAWAID

Miss Yoawamaln PHANTONG

Miss Kanokwan DANNAKINRAT

THE ENERGY FOR RURAL DEVELOPMENT PROGRAM

The principal aim of the Energy for Rural Development (ERD) program is to support the intercountry sharing of experience, insight, and information among rural energy planning, research, and implementing agencies in eight countries: Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, Thailand, and the United States. The ERD program is guided by a Steering Committee composed of members from each participating country. The Steering Committee is chaired by Dr. Sanga Sabhasri, Secretary-General of the National Research Council (NRC) of Thailand. The Program Secretariat is located in the offices of the NRC.

The ERD program is composed of four interrelated activities around which an action plan for intercountry research and communications support has been developed. The four activity sets are:

1. Rural Development Objectives, Energy Needs Assessment, and Data Development
2. Biogas: Technology, Assessment, and Social Organization
3. Fuelwood: Technology, Assessment, and Social Organization
4. Solar and Other Systems: Technology, Assessment, and Social Organization

In addition to advancing country rural energy development goals, the association of the research reported here with the ERD program will facilitate comparison of energy problems among participating countries, and provide for exchange of experience and diffusion of results.

Support for ERD intercountry activities is provided through a grant from the U.S. Agency for International Development, with additional support from the East-West Resource Systems Institute and other ERD member institutions.

THE EAST-WEST RESOURCE SYSTEMS INSTITUTE is directed to the overall goal of understanding how nations can maintain adequate, equitable, and reliable access to resources. The institute consists of a broad study of three interrelated programs: Food Systems, Energy Systems, and Raw Materials Systems.

International research groups are collaborating with RSI staff to analyze and conduct research on these systems. A series of databases and information exchange facilities is now being developed to support their studies. On an interdisciplinary basis, the various teams will explore these problems stressing their interrelationships in both local and international terms in the Asian and Pacific region.



Food Systems conducts research on the institutional and policy aspects of improving food security in the Asia-Pacific region; examines the complex interactions of administrative, technological, and social issues involved in developing food systems in marginal areas; and explores alternate food systems with special emphasis on: food and the city, food systems based on water environments, and institutional and policy aspects of biological nitrogen fixation.



Energy Systems provides analyses of the vulnerabilities of nations to disruptions in the flow of fuels; collects and analyzes data on energy supply, demand, and flows, especially those in rural areas; evaluates alternative development policies on a variety of energy systems; and develops energy indexing methodologies and information exchange both within and among nations.



Raw Materials Systems is concerned with the identification and evaluation of policy and strategy options that will benefit nations from the exploration and development of their mineral resource potential. The main research areas are: mineral assessment for national planning, innovative government-transnational company arrangements, uncertainties in future commodity trade, and case histories of mineral projects.

THE EAST-WEST CENTER—officially known as the Center for Cultural and Technical Interchange Between East and West—is a national educational institution established in Hawaii by the U.S. Congress in 1960 to promote better relations and understanding between the United States and the nations of Asia and the Pacific through cooperative study, training, and research. The Center is administered by a public, nonprofit corporation whose international Board of Governors consists of distinguished scholars, business leaders, and public servants.

Each year more than 1,500 men and women from many nations and cultures participate in Center programs that seek cooperative solutions to problems of mutual consequence to East and West. Working with the Center's multidisciplinary and multicultural staff, participants include visiting scholars and researchers; leaders and professionals from the academic, government, and business communities; and graduate degree students, most of whom are enrolled at the University of Hawaii. For each Center participant from the United States, two participants are sought from the Asian and Pacific area.

Center programs are conducted by institutes addressing problems of communication, culture learning, environment and policy, population, and resource systems. A limited number of "open" grants are available to degree scholars and research fellows whose academic interests are not encompassed by institute programs.

The U.S. Congress provides basic funding for Center programs and a variety of awards to participants. Because of the cooperative nature of Center programs, financial support and cost-sharing are also provided by Asian and Pacific governments, regional agencies, private enterprise, and foundations. The Center is on land adjacent to and provided by the University of Hawaii.

1777 East-West Road, Honolulu, Hawaii 96848