

Nature-induced Disaster Mitigation in Central America



Content

Acronyms	3
1 Executive Summary	5
2 Introduction	10
3 Evaluated activities	12
3.1 Current situation and problems: risk and disasters	12
3.2 Professional capacities, differences and asymmetries.....	12
3.3 Understanding of causes and possible solutions	13
3.4 Demand	14
4 Findings and evaluative conclusions.....	15
4.1 Higher education and research training in natural sciences and technology with reference to nature- induced disaster mitigation in C-A universities	15
4.2 Need for a regional research training network (documented interest among universities and political authorities)	17
4.3 Capacity and preconditions for training in disciplines relevant to prevention of nature-induced disasters at different levels.....	17
4.4 Academically strong areas at possible future network universities	18
4.5 Capacity in research management and research administration.....	19
4.6 Structures for program coordination and administration	20
5 Lessons learned	22
5.1 Regional proposals should be produced regionally and not adapted from proposals presented by one national institution	22
5.2 Subsidising national or regional facilities could produce dependency, sustainability should be the strategy from day one	23
5.3 The relationship between needs and demand should be carefully and strategically addressed	23

5.4 Responsibilities for regional coordination should be based on formally constituted regional institutions.....	23
6 Recommendations	25
7 Annexes.....	29
7.1 SWOT Analysis.....	29
7.2 Academically strong areas of relevance to a network	34
7.4 Regional projects and organizations funding regional projects related to nature-induced disaster mitigation	36
7.5 Organization and function of a Regional Research Council: a draft proposal by CSUCA.....	37
7.6 Bibliography, references.....	41

Published by Sida 2005

Department for Research Cooperation

Authors: Sten-Åke Elming, Prof. Applied Geophysics, Department of Applied Chemistry and Geosciences, Luleå University of Technology, 97187 Luleå, Sweden and Luis Rolando Duran, Executive Director, SPM Latinoamérica Consultores, Apartado 1609, Guadalupe 2100, San José, Costa Rica

Printed by Edita Communication AB, 2005

Art. no.: SIDA22344en

This publication can be downloaded/ordered from www.sida.se/publications

Acronyms

ANEP	Asociación Nacional de la Empresas Privada
ANUIES	Association of Mexican Universities and Higher Education Institutions
CABEI	Banco Centroamericano de Integración Económica
CASC	Central American Seismic Center
CATHALAC	Centro de Agua del Trópico Húmedo para América Latina y el Caribe
CATIE	Centro Agronómico Tropical de Investigaciones y Enseñanza
CECC	Coordinación Educativa y Cultural Centroamericana
CEPREDENAC	Centro de Coordinación para la Prevención de los Desastres Naturales en América Central
CIGEO	Centro de Investigaciones Geocientíficas
CNE	Comisión Nacional de Prevención de Riesgos y Atención de Emergencias
CIHH	Centro de Investigaciones Hidráulicas e Hidrotécnicas
CONRED	Coordinadora nacional para la Reducción de Desastres
COPECO	Comisión Permanente de Contingencias
COSUDE	Agencia Suiza para el Desarrollo y la Cooperación
CRRH	Comité Regional de Recursos Hidráulicos
CSUCA	Consejo Superior Universitario Centroamericano
DAAD	German Academic Exchange Service
ECG	Escuela Centroamericana de Geología
FLACSO	Facultad Latinoamericana de Ciencias Sociales
FUNA	Fundación Universidad Nacional Costa Rica
FUNDEVI	Fundación de la Universidad de Costa Rica para la Investigación
GTZ	German Technical Cooperation Agency
HRK	Association of German Universities
IDB	Inter American Development Bank
IDRC	International Development Research Centre (Canada)
IGCP	International Geological Correlation Program
INETER	Instituto Nacional de Estudios Territoriales
INSIVUME	Instituto Nacional de Sismología Vulcanología Meteorología e Hidrología
InWEnt	Internationale Weiterbildung und Entwicklung

JICA	Japanese International Cooperation Agency
LA RED	Red Latinoamericana de Estudios Sociales para la Prevencion de Desastres
LACEEP	Latin American and Caribbean Environmental Economics Program
NASA	National Aeronautics and Space Administration
NADIMCA	Natural Disaster Mitigation in Central America
NEMO	National Emergency Management Office
NMS	Belize National Metrological Service
PPP	Plan Puebla Panama
OVSICORI	Obseravtorio Vulcanologico y Sismologico de Costa Rica
PRRD	Regional Plan for Reduction of Disasters
SERCA	Seismotectonic Regionalization of Central America
SICA	Sistema de la Integracion Centro Americana
SINAPRED	Sistema nacional para la Prevencion de los Desastres
SINAPROC	Sistema Nacional de Proteccion Civil
SNET	Servicio Nacional de Estudios Territoriales
UB	University of Belize
UCA	Universidad Centroamericana de El Salvador
UCR	University of Costa Rica
UES	Universidad de El Salvador
UNA	Universidad Nacional Costa Rica
UNAH	Universidad Nacional Autonoma de Honduras
UNAN	Universidad Nacional Autonoma de Nicaragua
UNDP	United Nations Development Programme
UNI	Universidad Nacional de Ingenieria
UPA	Universidad de Panama
USAC	Universidad San Carlos
USGS	United States Geological Survey
UTP	Universidad Tecnologica de Panama
UWI	University of West Indies
UV	Universidad del Valle

1 Executive Summary

Central America is frequently affected by a great number of nature-induced disasters due to its exposure to various natural hazards and a societal vulnerability that is increasing with accelerated urbanization and deterioration of the conditions of the most vulnerable. The impact of these disasters is severely compromising regional preconditions for development, poverty reduction and competitiveness.

In order to support regional efforts for reducing the effects of nature-induced disasters Sida/SAREC has, since 1988, supported research and capacity building within the theme of disaster mitigation. In 2001 a proposal, Natural Disaster Mitigation in Central America (NADIMCA), was approved. However, for various reasons it was never launched. SAREC is prepared to reconsider support for training and research related to nature-induced disasters and the purpose of this evaluation is to make an inventory of higher education and research training in that field, identify the need for, and interest in, a program on capacity building and conditions for training and administration at the universities in the region, identify academically strong areas and structures for coordination and administration of a regional program etc.

The work has been implemented using questionnaires and interviews at twelve universities, six governmental institutes, one national association of private companies, and a number of regional organizations. Reviews of central documents were also carried out.

The evaluation reached several findings: capacity in research related to natural hazards is still quite weak in the region. Even if a number of programs on capacity building have been running and regional schools have been working for a long time, sustainable research environments in these countries are still non-existent. Depending on geological, meteorological and socio-economical conditions, threats, vulnerabilities and impacts shift, even if there are some threats in common to the entire region. Moreover, deep asymmetries in university capacity and national funding for hazard research are evident.

The serious impact of disasters has revealed the need for developing management solutions and has also lead to the priority of a risk management approach in new training programs. Current MSc programs, running on national or regional level, are most often broad to provide general insights into problems related to management, land use and planning but the technical capacity to construct vulnerability scenarios faces serious problems due to the lack of basic data. This “risk manager”

approach is based on the false impression that all basic data needed from natural sciences are there and that this area should no longer be given high priority. There is a need, but not much demand, for risk management specialists, however, in-depth discipline knowledge and studies of natural processes related to hazards are still indispensable and a clear demand for these has been expressed.

The current demand for professional profiles reflects the interests of specific sectors in society and it is often linked to the effects of nature-induced disasters and short term planning rather than long term efficiency or awareness promotion. Consequently, political decisions are often not based on analyses/strategies but on demands that do not reflect national needs, which in turn may lead to inappropriate investments.

Most funds for nature-induced disasters are directed to governmental institutes and this is where the data are collected and used for monitoring. As only limited research is conducted at these institutes, agreements are often signed with universities to give them the right to use basic data for research.

Research and detailed studies on risk require the participation of many disciplines. Social, economic and environmental vulnerability should be studied in order to develop good risk scenarios for decision making and planning. As a basis for all these scenarios, nature-induced disaster information is indispensable. SAREC has been supporting the region in this area of research and capacity building and the need for further studies certainly remains.

At all the universities approached the need for, and interest in, a regional program/network was expressed. However, it was often also made clear that such a network is of interest only if it can demonstrate strong regional ownership.

In many universities there is capacity for postgraduate training in at least one discipline related to nature-induced disasters. The training capacity is usually related to what is regarded as a scientifically strong area, and at each university there are at least one or two areas. However, the scientific level is most often not satisfactory as expressed by e.g. the very limited publication of research in international journals.

There is a general lack of research funding at the universities and on a national level. In some countries there are national Research Councils for Science and Technology with some resources, but these funds are very limited and nothing is directed especially at research on nature-induced disaster mitigation. In a political agreement from the presidential meeting in 1999 (Guatemala II) a commitment to action is expressed aimed at achieving better technical/scientific knowledge about natural and anthropogenic threats. This knowledge will hopefully lead to the reduction of vulnerability to, and impact of, disasters. Two of the main themes are: (a) better systems for monitoring of natural and anthropogenic phenomena; (b) research and technical development to obtain the information required for decision-making. Thus, the Strategic Framework includes research; however it is one of the few components that have not managed to mobilize funds.

The management of external funds, e.g. from international donors, is not considered effective in most universities. As a response to this administrative limitation, such funds are often managed by private foundations.

Project implementation and coordination at regional level is another issue to be carefully considered. There are no national resources for building strong capacity in all disciplines related to nature-induced disasters. Regional networking is one way of sharing costs for improving

and building capacity. However, it does not seem to be successful when the partners are on different scientific levels and when national commitments for continuation are not clearly defined and agreed on. Experience of regional organizations also indicates that regional programs should be formulated in a participatory process, including all countries. The tendency to convert individual or national projects into regional programs seems not to work. There are also many examples of successful programs that have had to close due to lack of funds when the project period ended, i.e. no strategy for transferring responsibility to the nation/region.

There has been a regional organization for Central American universities, Consejo Superior Universitario Centroamericano (CSUCA) working for forty years. This organization works with systems for accreditation, quality of education, postgraduate studies and research etc. CSUCA has the capacity for coordination and administration of regional programs.

The regional organization for governmental institutes for civil protection, risk management and natural disasters is Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPREDENAC). Government institutes are generally responsible for monitoring, development of warning systems and implementation of data, while research is usually conducted at universities.

At the presidential meeting in 1999, a Strategic Framework for the reduction of Vulnerability and Disasters in Central America was adopted. The governments have consequently committed themselves to work for the reduction of physical, social, economic and environmental vulnerability and thereby minimize the impact of nature-induced disasters. CEPREDENAC was given the mandate to develop a Regional Plan for Reduction of Disasters (PRRD) to operationalise this strategy.

CSUCA and CEPREDENAC should be the main actors in the coordination process to e.g. avoid duplication and overlapping functions.

We recommend support for a program on natural disaster mitigation, which should include capacity building, support to infrastructure and research. The following should be considered:

- (a) Priority should be on development of in-depth discipline research through e.g. PhD and MSc courses. This could be carried out in cooperation with Swedish/Nordic universities.
- (b) Research capacity should be concentrated on one or two disciplines at each country/university, as reflected by needs and strategic priorities. These scientific “hubs” will form bases for cooperation on equal terms in research and higher education and may increase the feeling of regional ownership. Support to the infrastructure of these hubs, i.e. laboratories, basic equipment for field training etc. is recommended.
- (c) National priorities should be determined through meetings between universities and governmental institutes. This process may be linked to the work of a new version of the Regional Plan for Reduction of Disasters that will be developed by CEPREDENAC.
- (d) In order to help solving the problem of research financing, a regional research council on natural disasters should be created. This council should be organized and run by CSUCA in cooperation with CEPREDENAC. Clear interest from CSUCA has been expressed for this and a proposal for such a council has been presented. Sida/SAREC is recommended to support such a council in terms of formation and

funds for research. Cooperation with CEPREDENAC is also expected to help attract funds to the research council.

- (e) The regional program and network for capacity building should be administered and coordinated by CSUCA. This is important for regional ownership of the program.
- (f) Capacity building is a long term process and governmental financing of the network and the research council for a gradual take over of the program should be guaranteed.
- (g) Courses in financial administration should be run for administrators and researchers. This could be organized by CSUCA.
- (h) Courses in drafting of proposals should be organized. These could also be carried out by CSUCA.
- (i) CSUCA has experience of research implementation and, in alliance with CEPREDENAC, could develop ways to facilitate the use of research results.
- (j) In order to stimulate interdisciplinary research in natural sciences, continuous meetings on natural hazard studies should be arranged. Research results should also be more easily available and a database/regional IT based library function is recommended. Also here CSUCA may play a major role.
- (k) It is recommended that regular meetings be arranged between researchers in the natural and social sciences to promote the use and understanding of results from natural sciences, and which may also lead to joint research. Such meetings could be arranged by CSUCA in cooperation with regional organizations such as Facultad Latinoamericana de Ciencias Sociales (FLACSO), Red Latinoamericana de Estudios Sociales para la Prevencion de Desastres (La Red) and Centro Agronoma Tropical de Investigaciones y Ensenanza (CATIE).
- (l) We also recommend that CSUCA takes the responsibility for coordinating the formulation of a project proposal. This process should be developed in a very participatory manner, and CEPREDENAC should play an important role in the identification of needs and priorities.

We consider these recommendations crucial for the creation of sustainable research and capacity building in the region. The success of any program is, to a considerable degree, dependent on ownership and demonstrated, long term support from the region.

The following actions are recommended in order to continue the process of provision of support for a program:

- (1) A meeting should take place between Sida/SAREC and CSUCA to discuss the possibilities for CSUCA to administer and coordinate the program and to form a Regional Research Council.
- (2) A meeting should be arranged by CSUCA with the Central American universities, CEPREDENAC and national organizations for science and technology to discuss the setup of a possible program and a regional research council.
- (3) National meetings should be arranged where prioritized areas of research will be defined. These priorities should be linked to the PRRD and CEPREDENAC.

- (4) After a plan and budget for the program is formulated by CSUCA, long term financing must be addressed. This should be done on a regional level through Sistema de la Integración Centro Americana (SICA)-CSUCA. On the national level it could be achieved through discussions between universities and governments, with reference to a documented interest and support from public and private universities in the region, from the national organizations of science and technology and from the business sector.
- (5) CSUCA presents a proposal to Sida/SAREC for evaluation and approval.

2 Introduction

The Central American isthmus is frequently exposed to a great number of rapid-onset natural hazards. The economic and social impact on the countries affected are severe and their vulnerability to hazards has increased due to e.g. accelerated urbanization, more advanced infrastructure and the deterioration of socioeconomic conditions of the most vulnerable groups. There is an urgent need in the region to strengthen local knowledge at various levels of the mechanisms aimed at the different type of hazards, and to be able to implement preventive and mitigation measures.

Since 1988, Sida has supported activities for disaster mitigation in the region in different forms:

- Most long term support has been to the Centre of Coordination for the Prevention of Natural Disasters in Central America (CEPRE-DENAC). This organisation deals with interregional exchange of technological, scientific, and social information and experience, and promotes joint efforts for problem analysis and development of regional strategies.
- During 1992–2000 a program for research capacity building in seismology, Seismotectonic Regionalisation of Central America (SERCA) was conducted. A total of 12 MScs and 4 PhDs from Costa Rica, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama were trained and graduated from the universities of Uppsala and Bergen, and an additional 34 graduates passed a six-month course in seismology. Within the SERCA program, regional research projects were carried out for several years supported by a locally administered research fund.
- October 2001: A proposal was approved by Sida's Research Council aimed at establishing a Post-Graduate School of Natural Disaster Mitigation in Central America (NADIMCA). The main objective of the School was suggested to be capacity building (MSc degree program) specialized in volcanic eruptions, earthquakes, landslides, floods and tsunamis. Socio-economic aspects of natural disasters were to be dealt with in cooperation with Facultad Latinoamericana de Ciencias Sociales (FLACSO). However, the program was never launched mainly due to unforeseen problems in the organisation of the regional coordination and administration of the network.

Sida is prepared to reconsider possibilities to continue supporting training and research related to hazards, vulnerability and risk reduction, if there is a clear and expressed need and if solid preconditions (administrative and scientific) exist in the region. Sida/SAREC's primary interest is to contribute to the strengthening of scientific capacities in this area at universities in Central America.

Expectations from this study are:

- Make an inventory of existing higher education and research training in the areas of natural sciences and technology with relevance to nature-induced disaster mitigation in Central American universities (postgraduate training, including MSc and PhD courses as well as short courses in specialisations).
- Identify if there is a documented interest among universities and political authorities and if universities are prepared to contribute to a program of capacity building.
- Identify existing capacities and prevailing conditions for training in disciplines relevant to the prevention of nature-induced disasters at the universities.
- Indicate the academically strong areas of relevance for a Central American network at each university and their development priorities and strategies for the future.
- Look into their capacity for research management and research administration.

The consultants identified key individuals at universities, public institutions and private organizations in order to answer key questions such as:

- Is there is an interest in a network on nature-induced disasters among universities and political authorities?
- Are universities prepared to contribute and how?
- The existing capacities and prevailing conditions for training in disciplines relevant to the prevention of nature-induced disasters at different levels?
- Strong areas of relevance to the network at each university?
- How can such a network be coordinated and administrated?
- What structures exist in the region or could be developed into a regional research council that could shoulder the responsibility of coordination and administration?

The Report has seven main sections, including an executive summary and introduction. Four main elements are developed in the section on Evaluated activities: Current situation and problems: risks and disasters; Professional capacities, differences and asymmetries; Understanding of causes and possible solutions; Demand. Findings and evaluators' concluding assessments of the intervention are given in the section Findings and evaluative conclusions, which is followed by Lesson learned coming from a wider perspective regarding good and bad practices. The two last sections are Recommendations and Annexes. The conclusions and recommendations arrived at by the consultants are intended to serve as input for Sida's considerations on whether to initiate preparations for future support for a research training network on nature-induced disaster mitigation in Central America or to abandon the concept.

3 Evaluated activities

(research and training for natural hazard evaluation and risk management)

3.1 Current situation and problems: risk and disasters

The impact of nature-induced disasters and societal vulnerability is still increasing in the region, and the capacity to reduce or control risk in an integrated fashion is absent or still very weak.

At a presidential meeting in 1999 (Guatemala II) a Strategic Framework for the reduction of Vulnerability and Disasters in Central America was adopted. The governments committed themselves to work for the reduction of vulnerability and the impact of nature-induced disasters. This commitment is reflected in budget and policy-making decisions: i.e. governments are increasing budgets for their specialized institutions (civil protection and scientific institutes) and financial institutions (Development Banks) are allocating funds in considerable loan operations (e.g. annex 7.4). In all the Central American countries there are a number of risk reduction projects and funds are available for development. None of these funds are for research or support universities. They are oriented to national institutes and are to be used for short term projects generally developed by companies under private bidding processes.

Even if funds are available and projects are running there is a severe lack of capacity to manage nature-induced disasters. This contradictory situation is still far from being clearly explained, and much research mainly developed by social scientists is trying to produce answers and proposals for action (see annex 7.6 for references). One reason for lack of development is that the institutional processes are not fed by a clearly defined and integrated research agenda, consequently efforts are dispersed and resource allocation inefficient.

3.2 Professional capacities, differences and asymmetries

Capacity in hazard analysis and research is still very low in the region, which is reflected by e.g. the number of people with PhD and MSc degrees in the region (see Olguin, 2001). Although many efforts have been made, and support has been received, for capacity building in subjects such as seismology, the situation is still far from satisfactory.

Universities are trying to respond to some of these needs with practical academic solutions. In many of the countries there is at least one MSc program related to risks and disasters. In every country, universities are integrating risk and disaster aspects into the professional curricula: architecture, engineering, sociology, planning, geology, psychology, etc.

Regional capacity and needs vary greatly between the countries. Depending on geological and meteorological conditions – and socioeconomic characteristics – the threats, vulnerabilities and disaster impacts shift. For example, risk of earthquakes is considered high in Nicaragua, Costa Rica, Guatemala and El Salvador, while the risk of volcanic eruption is regarded as highest in Nicaragua. The risk for inundation/flood is high in the entire region and landslides are regarded as the major risk in Honduras. Technical and scientific capacity is sparse or lacking and there are significant asymmetries in the region. In countries such as Guatemala, Honduras and El Salvador there are very limited professional resources in meteorology/ hydrometeorology (1 or 2 per country) and volcanologists are very rare in countries with high exposure to volcanic hazards (e.g. Nicaragua, Guatemala, El Salvador).

Asymmetries among countries become evident when an event, equal in magnitude and type (heavy rains, for instance), strikes the region and has different impact due to the socioeconomic structure, human development and environmental conditions in the countries. For example Costa Rica and Panama have much higher resilience capacities than Nicaragua and Honduras, because of their development in human conditions.

This shift in threats and vulnerabilities is often reflected in the priorities for capacity building expressed by universities. Regional asymmetry in capacity is reflected in the difference in national funding of the universities.

3.3 Understanding of causes and possible solutions

There is a false feeling of “already done” in terms of disaster studies. The process that has led to the priority of a “risk management approach” is based – in general terms – on the perception that the goals of research and technical development related to nature-induced disasters have been fulfilled and are now receiving too much attention and resources.

The current MSc programs, running on a national or regional level, are most often multidisciplinary and give a good general insight into problems related to management, land use, land planning etc. There are also regional programs and plans for projects on the theme of prevention and mitigation of natural hazards e.g. within the Plan Puebla Panama (PPP). There are courses, MSc programs and projects generally directed at implementation and management for planning, and human capacity with broad knowledge has been built. However, in order to be able to develop risk maps and more detailed analyses of risks, basic data and in-depth discipline research is still lacking.

There is a severe lack of detailed knowledge on the processes that create natural disasters, which means that strategies for mitigation cannot be based on a solid foundation. The need for more detailed research into natural sciences is therefore crucial.

Researchers representing various disciplines are contributing to the understanding of risks. There are organizations such as FLACSO, La Red and CATIE acting on a regional level on risk and disaster directed at social and economic research related to impact, vulnerability and risk management. The links between the natural and social sciences are weak and studies on impact, development and public policy are hampered by the lack of communication and interdisciplinary research. This problem is not unique for the theme of this evaluation and should also be addressed in a more general discussion.

Knowledge production is not being properly transferred. There are serious limitations on scientific information producers that prevent them

from sharing their knowledge with the decision-makers and the community. Vertical and horizontal flow of information is generally quite limited even within the scientific community and research information is not communicated between disciplines (e.g. natural to social sciences).

3.4 Demand

The perception among different actors and sectors (public, private, local, national) is that demand is rising for in-depth disciplinary studies (Annex 7.3) as well as processes providing information for disaster monitoring and understanding. Moreover, more complex vulnerability studies, with an emphasis on vulnerability scenarios and management plans, are requested. Regarding tools for risk reduction, there is a demand for the development of technical and policy solutions. The trend is demand for short term solutions and planning skills and specific studies generating technical data and information.

There is thus a need for higher education and scientific/technical personal in nature-induced disaster related areas (Annexes 7.2). The need of risk managers is clear, but no demand was perceived.



Figure 1 Universities, governmental institutes and regional organizations visited by this mission in Central America (for acronyms see page 4).

4 Findings and evaluative conclusions

The data has been collected through questionnaires, interviews at twelve universities and six governmental institutes with staff and university/institute authorities, as well as in regional Central American organizations and through review of central documents (Fig.1). The universities were selected, to a large extent, on the basis of previous involvement in the NADIMCA proposal. See also Annex 7.1 for findings.

4.1 Higher education and research training in natural sciences and technology with reference to nature-induced disaster mitigation in C-A universities

There are a number of MSc programs in the region and at most universities there are at least courses including various aspects of nature-induced disaster mitigation. For examples see Table 1.

Country	University	MSc-programs	Post graduate courses
Belize	University of West Indies		Vulnerability, social sciences
Costa Rica	UCR	Risk management and disaster prevention	
	ECG	Regional programs: Volcanology, landslides, geology. Plans for hydrology, meteorology	
	UNA-OVSICORI	Nature-induced disasters	Seismology, volcanology. Research programs in seismics, volcanology and multi-hazards vulnerability scenarios
El Salvador	UCA		Social science diploma course
	UES		Part of a regional program UNAN-CIGEO
Guatemala	USAC	Plans for a program on construction codes within Architecture School	Short multidisciplinary courses

Honduras	UNAH	Risk and disaster management	Can give courses in meteorology/hydrology
Nicaragua	UNAN-CIGEO	Looking for regional Accreditation: Risk assessment and disaster Reduction	
Panama	UTP	Looking for regional Accreditation: Seismic vulnerability and design of constructions Geotehnology, landslide Plan for a program on flood hazards	
	UPA		Seismology, volcanology, landslide
Regional	FLACSO		Research program on disasters
	CATIE	Integrated watershed management	LACEEP courses and research

Table 1 Higher education related to natural disasters at the universities evaluated. For acronyms see page 4.

Professional provisions are defined by two main trends:

1. The dominating trend is the training of “risk managers” with a very generalist approach and content:
 - At the Universidad Nacional Autonoma de Honduras (UNAH) and University of Costa Rica (UCR) master’s programs were created to produce a new professional profile: risk managers.
 - In Universidad San Carlos (USAC: Guatemala) and Universidad de El Salvador (UES), proposals for comprehensive postgraduate programs to create generalists are under discussion.

These programs usually stem from the need to convince people in governmental organizations, decision makers to use disaster mitigation and socioeconomic and environmental vulnerability information. This means the programs are broad, giving a general knowledge of a number of scientific disciplines and implementation of data for management. This also means that the research training at the MSc level is usually not in-depth as far as single disciplines are concerned.

2. Training with deeper specialization and disciplinary research and in some cases combined with a broad vision of the risk and vulnerability problems:
 - Central American Geology School at UCR: MSc programs on landslides, volcanology, seismology, hydro geology.
 - UNAH in Honduras: MSc program on water resources. A change in their risk management approach is under serious discussion.
 - Centro de Investigaciones Geoscientificas (CIGEO) in Nicaragua: MSc program that mixes general-specific approaches, but focuses on specialization in the research part (thesis).

The training process is affected by the lack of high level professionals (PhD) to educate and support researchers. There is also a lack of qualified professionals to direct and supervise theses.

Research and in-depth studies on risk and vulnerability reduction require the participation of many disciplines. Social, economic and environment vulnerability should be studied in depth in order to develop good risk scenarios for decision making and planning. At the base of all these processes, nature-induced disaster information is indispensable. SAREC has been supporting the region in this last area in which the needs are still quite great.

4.2 Need for a regional research training network (documented interest among universities and political authorities)

There are a number of internationally funded disaster mitigation related projects running in the region (see Annex 7.4). However, with the exception of a project at CEPREDENAC, and to some extent at CIGEO, training in order to build research capacity as well as basic research is not included.

All the universities that have been approached, in terms of interviews with staff and often also university authorities, express the need for and deep interest in a regional network. However, it was often also made clear that such a network is of interest only if it can demonstrate strong regional ownership.

The political agreement from the presidential meeting in 1999 (Guatemala II) states a commitment to actions aimed at achieving improved technical/scientific knowledge about natural and anthropogenic threats that will lead to the reduction of vulnerability to, and impact of, disasters. Two of the main themes are:

- (1) Broadening and modernizing activities in order to obtain information required for decision making, activities that include research and technical development.
- (2) Establishment of modern monitoring systems for natural and anthropogenic phenomena for early alert.

Thus, the Strategic Framework includes research, but it is one of the few components that has not managed to mobilize funds. The low profile of the universities in CEPREDENAC and the lack of coordination between CSUCA and CEPREDENAC may partly be the reason for this.

4.3 Capacity and preconditions for training in disciplines relevant to prevention of nature-induced disasters at different levels

In many of the universities there is capacity for postgraduate training in at least one discipline related to nature-induced disasters and there are already MSc programs running. However, the scientific level is often not satisfactory as expressed by the very limited number of publications in international journals. To make the MSc programs efficient, the capacity of staff and the quality of research has to be strengthened. However, resources are limited and one way of strengthening research capacity is through concentration of resources and networking. In order to create a sustainable research environment, capacity building is a necessity, however, by itself it is not enough.

One problem that is often experienced after long term international support is that when students return to their home universities after their research training, there are not sufficient resources or infrastructure to continue their research. Infrastructure and funds for research must go

hand in hand with capacity building. In some universities/countries there are structures for funding, but resources are very limited.

Capacity building, infrastructures for research, competition for grants and international cooperation are some elements for improving the standard of research and thus areas towards which support can be directed.

In most of the universities there are good preconditions for hosting students from the region.

4.4 Academically strong areas at possible future network universities

As a result of previous and current programs (CEPREDENAC, SERCA), seismology is generally the most developed discipline in the region and at most universities there is at least one relatively strong discipline of relevance to the network. Again, the scientific level even in the areas regarded to be strong, is often not of international standard and needs support to develop.

The following table (2) shows results from the questionnaire sent to the universities. In many cases it represents the perception of the academic units addressed by this consultancy, however it is not an exhaustive analysis of the universities' capacity and potential. See also Annex 7.2.

Country/ University	Geology/ Geophysics	Geotech- ology	Seismo- logy	Volcano- logy	Hydro- geology	Meteor- ology	Risk man- agement	Social Sci- ences	GIS	Environ- ment	Engineer- ing
Belize											
UWI and UB								•			
NMS						•					
Costa Rica											
UCR	•	•	•	•	•	•	•	•			•
OVSICORI-UNA		•	•	•					•		
El Salvador											
UCA		•									•
Guatemala											
USAC		•	•		•						
UV											•
Honduras	•		•				•				
UNAH											
Nicaragua											
CIGEO-UNAN	•	•					•			•	
UNI					•					•	
Panama											
UTP		•			•	•	•		•		•
UPA	•	•	•								
Regional											
FLACSO								•			
CATIE							•			•	

Table 2 Academic areas regarded as strong at the universities evaluated. Note that in Belize the NMS is the National Meteorological Service and not a university. For acronyms see page 4.

4.5 Capacity in research management and research administration

There is a general lack of research funds at university and at national level (Table 3). In some universities/countries there are structures for funding but the resources available are very limited. At some universities there are minor funds that can be applied for and in some countries there are National Research Councils for Science and Technology which have funds for research. However, both at university and national levels funding of research projects is hard to get and the amount of funding is very limited. The funds that are available are directed at support for research in general and not in particular for research in nature-induced disasters.

The management of external funds works well in some universities, while in the majority it is not considered effective (Table 3). Regional projects for capacity building and research are often coordinated through a university in one of the participating countries and the fund is administered by private foundations, e.g. Fundacion Universidad Nacional Costa Rica (FUNA) in Costa Rica. The evaluation is a result of the interviews and answers to the questionnaire; it represents the perception of the academics consulted. The consultants have not conducted a deep analysis of the administration situation at the universities, neither was any administrative authority consulted.

Country	University	Administration of funds	Research management
Belize	UWI, UB	Poor administration.	No university funds for research. No National Council for Science and Technology.
Costa Rica	UCR	Poor administration. External funds are administered through private foundation, FUNDEVI	University fund for research (total budget ca 20 000 US\$). National Research Council not for basic research (total budget ca 80 000 US\$)
	OVSICORI-UNA	Poor administration. External funds are administered through private foundation, FUNA.	
El Salvador	UCA	Good administration of international cooperation.	No university fund National Research Council, but no funds for research.
Guatemala	USAC	Poor administration. Private foundations for external funds.	University funds, inadequate reviewing system. National Research Council budget to match proposals approved by other foundation.
Honduras	UNAH	Por administration. Expected to improve through SAREC cooperation.	Funds expected through external cooperation. No national fund for basic research.
Nicaragua	CIGEO-UNAN	Good administration.	Matching funds from the University.
	UNI	Good administration.	Small university budget for research, expected to increase. No national funds.
Panama	UPA and	Acceptable administration.	No university funds.

	UTP		National Research Council with funds for research. Strong competition, projects up to ca 50 000US\$ can be funded.
Regional	FLACSO	Experienced in national and regional project administration	Collaboration with CSUCA. CEPREDENAC, AEC.
	CATIE	Experienced in administration of regional programs	Collaboration with national, regional and other International organizations. Their own infrastructure, including equipment.

Table 3 Capacity for research administration and research management at universities and some regional organizations. For acronyms see page 4.

4.6 Structures for program coordination and administration

Central American political and technical cooperation is organized through Sistema de la Integración Centro Americana (SICA). Within SICA governmental institutions are organized under regional secretariats and specialized regional institutions. The regional organization for the universities is the Consejo Superior Universitario Centroamericano (CSUCA).

CSUCA works with systems for accreditation and quality of education; postgraduate studies and research; relationship between universities and society; relationship universities and productive sector; regional editorial – joint efforts to support publications of regional interest; library network; student welfare etc. CSUCA receives support and also administers externally funded projects. Cooperation has been established with organizations from e.g. Germany: the Internationale Weiterbildung und Entwicklung (InWEnt), German Technical Cooperation Agency (GTZ), the German Academic Exchange Service (DAAD), and the Association of German Universities (HRK), for projects related to accreditation, quality evaluation and management of higher education. Within this theme CSUCA has also gained support from IDB. CSUCA is administering an Academic Exchange Program between Central America and Mexico, cooperation through the Association of Mexican Universities and Higher Education Institutions (ANUIES). More than 105 academic regional exchange projects have been funded through this program, which started in 1998. The funds for the program have mainly been provided by the Mexican government.

The regional organization of governmental institutes for civil protection, risk management, and natural hazards is “Centro de Coordinación para la Prevención de los Desastres en América Central” (CEPREDENAC). This organization was created and consolidated with considerable participation by Swedish cooperation organisations (Sida). Some universities participate in CEPREDENAC’s national councils. The institutes are generally responsible for monitoring and data collection, developing warning systems and implementation of data (see Annexes 7.3), while research is usually not a part of their activities. CEPREDENAC has given Instituto Nicaragüense para Estudios Territoriales (INETER) the responsibility to develop a tsunami warning system for the region and Servicio Nacional de Estudios Territoriales (SNET), El

Salvador, has been delegated the responsibility to develop a risk map of Central America for natural disasters and the Central American Geology School (ECG-UCR) is running a regional Central American Seismic Center (CASC).

At a presidential meeting in 1999 (Guatemala II) a Strategic Framework for the reduction of Vulnerability and Disasters in Central America was adopted. Consequently these governments have committed themselves to working for the reduction of physical, social, economic and environmental vulnerability and thereby minimizing the impact of natural disasters. CEPREDENAC was, at this meeting, given the mandate to develop a Regional Plan for Reduction of Disasters (PRRD) to operationalise the strategy. A plan, which encompasses the period 2000 to 2004, was presented. This plan summarizes principal actions for disaster prevention on national and regional level and has been coordinated by CEPREDENAC. A planning grant has now been approved by Sida/Norad for upgrading this plan. The project began in July 2005 and is scheduled to end in June 2006.

Both CSUCA and CEPREDENAC are located in Guatemala.

5 Lessons learned

5.1 Regional proposals should be produced regionally and not adapted from proposals presented by one national institution

The tendency of converting individual or national projects into regional programs does not appear to work. Networking to improve and build capacity also does not appear to work if partners are on different scientific levels. Usually, Costa Rican – or even Panamanian – proposals for international cooperation have been rejected because these countries are not donor priorities. Given that regional cooperation is a donor priority, these proposals are some times “regionalized” in order to obtain the necessary resources. Due to the absence of an extensive participatory process, the nature of the proposed project is still national, which results in a hybrid operation, with weak regional ownership and several conflicts of interest.

The idea of concentrating all efforts into building capacity in one country and then using this “center of knowledge” as a source for the region does not appear to work in the current Central American context. It has often been considered a solution in an environment of scarce technical and scientific resources, and a way to produce capacity in the short term, while capacity was being built up in the weakest countries. Reducing the asymmetries by consolidating everyone’s capacity is today’s regional strategy, and the promotion of coordination, exchange, integration, and sharing of institutional capacity and advantages appears to be far more adequate for this purpose. In Costa Rica there are Central American regional schools that have been working for ca 30 years and still there is no sustainable research capacity in the region.

Experience from regional organizations, such as CEPREDENAC or Comité Regional de Recursos Hidráulicos (CRRH) has shown that, from their initiation, regional programs should be identified and formulated in a participatory process (institutions from all the countries). The adaptation of national proposals generally produces programs artificially structured for regional execution.

5.2 Subsidising national or regional facilities could produce dependency, sustainability should be the strategy from day one

There are many cases of successful programs/projects that had to close because sustainability beyond the subsidy/funding period was never previewed, discussed or defined. Strategies on how the country and region are to sustain programs/projects should be defined at the very beginning of the negotiation process in order to ensure that proposals and benefits will last, even when funding has been phased out.

However, it is important to point out that sustainability not necessarily mean a takeover of 100% of the budget; rather it implies a shift in responsibility and reflects a national need and guarantee for continued research.

5.3 The relationship between needs and demand should be carefully and strategically addressed

The demand for professional profiles and scientific products reflects the interest of specific sectors in society: financial sector, emergency and rescue organizations, private sector etc. This demand is directly linked to the effects of nature-induced disasters, more than as a result of planning processes or awareness promotion. In these terms, existing demand does not necessarily reflect real national needs.

Political decisions are therefore often not based on analyses/strategies but on demands, which do not reflect the need of the country and may lead to inappropriate investments.

5.4 Responsibilities for regional coordination should be based on formally constituted regional institutions

Central America has regional institutions based on agreements between countries. In these terms, they are legitimated by the governments. Consejo Superior Universitario Centroamericano (CSUCA) and Centro para la Prevención de los Desastres Naturales en America Central (CEPREDENAC) are two regional institutions that must be major actors in any coordinated process; avoiding duplication or overlap of functions at regional level.

Within CSUCA a strategic plan is under discussion, a plan, which includes systems for regional research. CSUCA has the capacity to develop a regional research council and could, with some support, also coordinate and administer a regional program in natural disaster mitigation.

CSUCA has also expressed a deep interest in developing, administering and coordinating a regional research council and some preliminary plans have been formulated, which include proposals for structure and operation (Annex 7.5). CSUCA expects such a research council to be financed by the national councils for research and technology and by external, international donors, through which support to the region for research can be channelled. However, for the development of the council, support from e.g. Sida/SAREC would be crucial and a commitment on both national and regional levels is necessary. In relationship to this it is important to emphasize the necessity of, at the very beginning of the support, defining the process of a regional take over of financial responsibility.

SICA institutions are used to receiving funds from the Central American countries and national institutions. The possibility of establishing a unified and unique funding process for all regional institutions is under discussion. However it is too soon to discuss possible commitment from

governments before a concrete program proposal is formulated, but judging from experience of previous SICA processes for funding, a positive outcome of negotiations for funding of a regional research council may be feasible.

Most resources are directed to governmental institutes. At these institutes, data are collected and used for monitoring of natural hazards. As generally only minor research is conducted the cooperation with, and research capacity building at, the universities is important. Such cooperation is also seen in many Central American countries where universities can use the data for research. This suggests that cooperation between the regional organizations CSUCA and CEPREDENAC and a joint effort for a regional research council should be rewarding. CEPREDENAC will also be engaged in the formulation and realization of a new version of the Regional Plan for Reduction of Disasters (PRRD) (see Annex 7.4), to which the priorities of a network on research and capacity building may be linked.

6 Recommendations

The absence of an integrated and well coordinated approach from the academic/university sector could be the main reason for the lack of funds for research into nature-induced disasters.

A program on capacity building and research supported by Sida/SAREC could be the incentive for such an approach.

Research and in-depth studies on risk and vulnerability reduction require the participation of many disciplines. However, a basis for all risk scenarios is in-depth discipline research in natural sciences with reference to natural processes. SAREC has been supporting the region in this field and the needs are still quite extensive. Considering this and the wide spectrum of needs, we recommend SAREC to continue focusing on this type of research and training.

In order to attain sustainable development of research, long term support is needed and a guarantee/model for continued governmental/regional financing.

We recommend support for a regional network, capacity building and research into nature-induced disaster mitigation, with reference to what follows below.

Capacity for research in priority areas: a scientific “hub” in each country/university

Priority should be placed on development of capacity for in-depth discipline research. This can be achieved by using PhD training through international cooperation, by MSc studies in national science programs in the region and by networking.

As there are no resources to build capacity for higher education and research in all disciplines at each university/country, networking is a way to overcome this problem. Networking, including research cooperation, exchange of teachers and facilities open for the region to support capacity building does not however, appear to work if the partners are on different scientific levels. One way to overcome this may be through building research capacity with concentration of resources to one or two specific scientific areas in each country/university. We recommend the formation of scientific “hubs” that may work as a resource for the region and serve as a basis for cooperation on more equal terms. The possible themes of these hubs are defined by the needs and/or strong areas at the relevant universities. However, priorities should be defined through discussions on a national level, discussions that include universities and governmental institutes (see below). As the need for seismologists is more

or less covered, seismology will not be of highest priority for support, however it is important and may well be one of the “hubs”. A network of such hubs would help to solve the problem of ownership, guaranteeing the national benefits from a program and would be an important key to strengthening cooperation in the region.

A MSc/PhD program could be supported through scholarships, travel costs etc. and infrastructure. Support to infrastructure may be on both local and regional level, e.g. laboratories, basic equipment etc. on the local level and databases/library, capacity for publication, seminars and conferences on a regional level.

Often governments use foreign consultants to solve problems related to natural disasters. The reason for this may be a lack of national capacity, the short term solutions expected by the politicians and lack of interest in long term national capacity building.

Creating a network of hubs of specific knowledge may be a way to increase confidence in Central American capacity to solve national problems. This may also attract governmental interest for research funding and support to the network.

Resources are limited and fragmentation is always a problem as was pointed out in an evaluation of NADIMCA (Tröften, 2001). The concentration of national resources to specific areas of research and strong networking in the region may be an answer to the problem of fragmentation.

Creation of a regional research council for Central America

A regional research council may have a significant impact and it is an important part of securing sustainable development of research. The use of a regional organization for coordination and administration will also be one way to strengthen regional ownership.

CSUCA is recommended as an organisation who could develop such a council, as a first step within the theme of nature-induced disasters, but with an operational structure that could be broader. With this research council profile, close cooperation between CSUCA and CEPREDENAC is recommended. We suggest that a network on nature-induced disasters is coordinated and administered by CSUCA. In order to succeed in this, a scientific coordinator must be appointed and funds allocated for administration. In CSUCA a strategic plan is under discussion, a plan which includes development of systems for research. CSUCA has the capacity to develop a regional research council, and could also coordinate and administer a regional program in nature-induced disaster mitigation. Serious interest in this has also been expressed by CSUCA. Cooperation with CEPREDENAC may also increase interest in such a council and help in attracting funds.

The formation of a regional research council for Central America is a way to stimulate research and increase scientific capacity. Such a council could also organize capacity building to solve basic problems such as research and financial administration, proposal drafting etc. and is also a way through which support from international donors could be channelled.

It is recommended that CSUCA run a course in financial and research administration directed at both administration staff and researchers. The organisation of workshops on drafting proposals is also strongly supported.

A regional research council would, to some extent, solve the problem of research funding, however in order to promote a sustainable research

environment, funds to support development of infrastructure should be made available. This would be linked with the development of the national hubs and the scientific areas selected for specialization.

Implementation of research results in society

It is vital to link the implementation of research results in society and the development of new ways for implementation with a regional network in nature-induced disaster research. CSUCA has experience of research implementation and – in an alliance with CEPREDENAC – their experience should be used to develop ways for communication with society and facilitate the use of research results. Research results should be more easily available and seminars and the formation of a database/regional library function are recommended.

Interdisciplinary research and research cooperation between natural and social sciences

To stimulate interdisciplinary research in natural sciences, continuous meetings on nature-induced disaster research should be arranged. A link to the International Geological Correlation Program 474 (IGCP) could also be rewarding.

The link between natural processes and social impact-vulnerability is often not clear. It is recommended that regular meetings be arranged between researchers in the natural and social sciences to promote the use and understanding of results from natural sciences, which may lead to joint projects. Such meetings could be arranged by CSUCA in cooperation with regional organizations such as FLACSO, La Red and CATIE.

Prioritized areas and proposal

We recommend that national meetings between universities and governmental institutes should take place to define prioritized research areas that reflect national strategies. This may be linked to the new, updated Regional Plan for Reduction of Disasters to be developed by CEPREDENAC.

We recommend that CSUCA take responsibility for coordinating the formulation of a project proposal. This process should be developed in a very participatory manner, and CEPREDENAC should also play an important role in the identification of needs and priorities.

Proposed actions to proceed for an eventual research collaboration

- a. A meeting should take place between Sida/SAREC and CSUCA to discuss the opportunities for CSUCA to administer and coordinate the program and to form a Regional Research Council.
- b. A meeting should be arranged by CSUCA with the Central American universities (and national organizations for science and technology) to discuss the setup of a possible program and a regional research council.
- c. National meetings should be arranged where prioritized research areas will be defined. These priorities should be linked to PRRD and CEPREDENAC.
- d. After a plan and budget for the program is formulated through CSUCA, long term financing must be addressed. This should be done on a regional level through SICA-CSUCA, as well as on the national level through discussions between universities and governments, with

reference to a documented interest and support from public and private universities in the region, from the national organizations of science and technology and from the business sector.

- e. A proposal is presented to Sida/SAREC for evaluation and approval.

7 Annexes

7.1 SWOT Analysis

SWOT analyses of the candidate universities with reference to the following questions:

- Are staff qualified and experimental facilities sufficient to meet competence requirements necessary to provide a postgraduate training in one or several topics?
- Gaps in resources?
- Academic resources available for postgraduate education (MSc, PhD, short specialist training)?
- Do the faculties have resources to host MSc and PhD students from other countries in the region?
- Do these universities have the capacity to carry out the necessary administration (reporting, financial administration, monitoring, purchasing equipment)?
- Are they willing to contribute their own financial resources into strengthening the network?
- What is the potential of the universities as concerns collaboration within a research training network? Are there currently any collaborative links, partnerships or sharing of resources?

Belize

University of West Indies (UWI) and University of Belize UB):

S – UWI is a centre for distance education, and a link to the Caribbean countries. In Belize there is also a Centre for Climate Change at the National Meteorological Service (NMS) and environmental studies is of high priority. In social sciences related to disaster mitigation there are qualified staff for postgraduate training.

W – Natural science is weak and training of faculty members is necessary while infrastructure needs to be strengthened. Capacity for financial administration etc. is poor. Possibilities for providing financial support to a network are very limited. Cooperation with the National Emergency Organization (NEMO) has been initiated but should be better. Coastal vulnerability studies, barrier reefs are of high priority and UWI-UB needs to develop research in this area.

O – Coastal vulnerability studies could be developed for Belize and UWI-UB might have a shared leading role in Central America. They can host student from other countries for postgraduate training. The UWI is collaborating with the Caribbean countries in a distance education network and this experience of distance education may be of benefit for the Central American regional networking. NEMO needs a national source of staff and it should be possible for these universities to meet that need.

T – The capacity at the universities for research into natural sciences is very limited and support through a regional network may not be enough to create the necessary infrastructure for a sustainable research environment.

Costa Rica

Universidad de Costa Rica (UCR):

S – The university has been appointed by CSUCA as a Central American School, i.e. a resource for the region. The university has also strong links to CEPREDENAC and coordinates the Central American Seismic Data Acquisition Center. A multidisciplinary MSc program in risk management and disaster prevention is running and they have demonstrated their ability in postgraduate training. Post graduate courses, MSc programs, are offered in a number of disciplines e.g. volcanology, seismology, hydrology, meteorology. The capacity for landslide and urban planning is also considered to be strong. They can host student from the region and the university contributes cash and infrastructure resources to regional postgraduate programs.

W – Resources for research are limited and it is necessary to increase the in-depth discipline research. Training of staff is necessary to increase the quality of the postgraduate programs. Financial and research administration is poor.

O – In the framework of Central America, UCR has good academic and infrastructure resources and there are a number of areas, which could be developed as a regional resource. Their experience from their position as a Central American School may also be a good platform for developing such resources.

T – Not possible to agree on prioritized areas within Costa Rica. Poor administration of funds may be an obstacle.

Observatorio Vulcanológico y Sismológico de Costa Rica (OVSICORI), Universidad Nacional Costa Rica (UNA):

S – The university is running a multidisciplinary MSc program on natural disasters and is able to host students from the region. Seismology, volcanology and land use planning (a cross section between natural disaster studies and society) are strong areas. Capacity for applied GIS is also strong.

W – Lack of qualified staff to supervise postgraduate students and to instruct young researchers. Infrastructure, like good laboratories, is weak. In-depth discipline research needs to be strengthened. The university can manage projects, but financial management is not efficient.

O – Natural disasters, seismology and land use planning form a possible resource area which could be developed for the benefit of the region.

T – The network may be hampered by poor administration. Not possible to agree on prioritized areas within Costa Rica.

El Salvador

Universidad Centroamericana de El Salvador (UCA):

S – The university has a good capacity in civil engineering and seismic vulnerability of constructions, as well as geotechnology. Postgraduate courses with reference to natural disasters do exist in the social sciences. There are academic resources for postgraduate training in technical science and they are able to host MSc students from the region. The research administration is efficient. Close cooperation with SNET makes research possible. The university can match external projects with funds and they have experience of international collaboration.

W – No postgraduate training in natural disaster mitigation. Scientific production, publications, limited. No specific fund for research within the university. Basic research is lacking and there is no capacity in hydrometeorology.

O – The civil engineering profile- seismic building codes- may be developed as an example of application of research and the link to society's needs.

T – Natural sciences are not strong and the link to basic research may be a problem.

Guatemala

Universidad de San Carlos (USAC):

S – There is a commission in risk management at the university. Seismology, landslide and geotechnology are considered strong areas in education/research. There is staff for postgraduate training in at least one area and the faculty can host regional MSc students. National matching of funds for external cooperation is possible and there is a university fund for research. Good experience from collaboration with different agencies and international universities. Cooperates with INSIVUME and CON-RED.

W – No specific courses in natural disaster mitigation, limited multidisciplinary courses exist. There is a severe lack of resources to hire new staff members. Laboratory equipment is old. University administration is complicated, but works. Research production is limited and in-depth discipline work has to be strengthened. Competence in volcanology is lacking.

O – The funding support from the university is a good sign for opportunities to develop research capacity. One area among seismology, landslide and geotechnology may be developed into a hub.

T – The lack of economic resources to hire new staff may be a serious threat to the development of a sustainable research environment.

Honduras

Universidad Nacional Autonoma de Honduras (UNAH):

S – The university has a multidisciplinary MSc program in Risk and Disaster Management. New institute in geosciences that includes a number of disciplines. Strong disciplines are seismology and general geophysics, and staff including two PhD and two MSc in seismology and one PhD in geophysics. The staff is qualified to run postgraduate programs in seismology and the university has capacity to host regional students. No funding contribution, but staff can be offered by the university to a regional network. The university has been involved in a number of collaborations, e.g. United States Geological Survey (USGS) cooperation in seismology and others.

W – Capacity in meteorology and inundation is weak and reinforcing this should be a high priority. As landslides are a problem related to inundation, geotechnology, mechanical properties of soils etc, need to be developed. Research and financial administration is poor. Library with modern literature is lacking. Research is conducted in seismology only. Research needs to be strengthened and include other disciplines (e.g. geophysics). No funding for research. Capacity in volcanology and structural geology is lacking and is important for the country. Cooperation with COPEC should be stronger.

O – The network is regarded as a possible way to improve the capacity, exchange of teachers, for supervision of theses etc. UNAH have the capacity to develop a MSc program in seismology. Developing cooperation with COPEC should provide access to data, which would benefit capacity building for research.

T – The lack of resources for research will make the development of research in priority areas difficult. Poor administration will hamper capacity building.

Nicaragua

Centro de Investigaciones Geocientificas (CIGEO), Universidad Nacional Autonoma de Nicaragua (UNAN):

S – A MSc program in Risk Assessment and Disaster Reduction is running with students from the region. There is collaboration with universities in six Central American countries in this program. Geology and geophysics is strong and there are people in the group with Licentiate and PhD degrees. Good facilities in laboratories. Have the capacity to run MSc programs and to host students from the region. The university can match external funding e.g. the MSc program, with cash support. There is collaboration with INETER and experience of international collaboration. The administration of research funds is good.

W – Lack of capacity in volcanology, meteorology, hydrology/inundation. These areas need to be developed for the country. Research funding is lacking.

O – Experience from the MSc program makes CIGEO a strong candidate for a regional hub in a specific area/discipline.

T – The lack of research funding is a significant threat to sustainable development of research capacity.

Universidad Nacional de Ingeniera (UNI):

S – Civil engineering-technical development is the focus of education. Environmental vulnerability and hydrology are areas of priority. There is an MSc program in environmental studies which is planned to be developed into a PhD program. Capacity for a postgraduate program in environmental vulnerability, however, not directly linked to natural disasters. University administration is good and they are able to host foreign students. There is a small university budget for research. Good relations with INETER and SINAPRED. Experience from international collaboration.

W – Risk analyses and physical planning, land use – all need to be developed. Not possible to obtain matching funds for external projects. Lack of modern literature, library. Basic infrastructure is weak. Capacity for supervising theses needs to be strengthened.

O – The profile of the university is towards applied research, consequently technical solutions related to natural disasters may be developed. Land use and planning may be areas to focus on.

T – The lack of research funds is a serious drawback for capacity building in research. As the focus of the university is on applied research, the link to natural sciences may be a problem.

Panama

Universidad Tecnologica de Panama (UTP):

S – Center for flood hazards, with six–seven engineers. An MSc program in structural design. Staff with PhD degrees in seismic design-constructions and in remote sensing. Can support external project through infrastructure, but not with matching funds. Offers consultancy services in flooding, landslide mitigation. The university has good cooperation with SINAPROC, which links the technical data to political impact.

W – Capacity in land planning is needed. Lack of disciplinary depth in a number of areas related to nature-induced disasters. Publication of research limited. Lack of research funds, no funding from the university.

O – The flood hazard center could develop a MSc program, but capacity building of staff would be necessary. Linkages to the political system form a good basis for implementation of applied results and lessons can be learned and developed further.

T – The quality and development of education and applied research will probably suffer from the lack of in-depth discipline research. Limited possibilities for funding will also hamper the development of research capacity.

Institute of Geosciences, Universidad de Panama (UPA):

S – Seismology is probably the strongest area of research. The university is well equipped and there is a good library of seismological literature. Exploration geophysics is also strong. Publication of research in international journals. Can host foreign students and there is a capacity for postgraduate training in certain fields, e.g. seismology, exploration geophysics. There are courses in these disciplines as well as in volcanology and landslides, but no program for natural disasters in general.

W – Lack of technical equipment. Lack of funds for research. Landslide studies and volcanology are areas that need to be strengthened.

O – Seismological research can be further developed within the framework of a regional network. Inundation and landslides are severe problems in Panama and in Central America and the application of geophysics related to this could be another area for development.

T – Lack of research funds is perhaps the most serious threat to sustainable development of research, especially for basic research.

7.2 Academically strong areas of relevance to a network

Belize

UWI and UB: engineering lab., Social science.

NMS: Meteorology, Climate Change Center (Caribbean Climate Change Center).

Costa Rica

UCR: Volcanology, seismology, hydrology, geology, geotectonics, hydrogeology, meteorology, risk management.

OVSICORI (UNA): Seismology, volcanology, tectonics, GIS.

El Salvador

UCA: Seismic design-engineering, geo technology

Guatemala

USAC: Seismology, landslide, hydrology, hazard assessment.

UV: Geotechnology-soil mechanics. Structural systems lab.

Honduras

UNAH: Seismology, general geophysics.

Nicaragua

UNAN-CIGEO: Assessment and risk management, geology and geophysics, physical properties of rocks and soils.

UNI: Environmental vulnerability, hydrology.

Panama

UTP: Flood hazard, landslides, seismic-structural design, remote sensing, assessment of water resources, water quality and meteorology.

Centro de Investigaciones Hidráulicas e Hidrotécnicas (CIHH)(UTP): hydrology and hydro- technology

UPA: Seismology, landslide, applied geophysics.

Regional institutions

FLACSO: Social and multidisciplinary research on risk and disaster (Themes:

Environmental science and risk management; managing urban risk through urban and territorial planning; development, environment, social policy; decision making and public policy formulation (sectoral, territorial, investment))

CATIE: land planning and assessment, risk management in watersheds, hydrometeorology disasters, environmental economics.

7.3 National governmental institutes

The governmental institutes relating to natural disasters generally have the responsibility for monitoring, databases and implementation of data for societal needs. As they are generally not carrying out any research they often have agreements with national universities who then gain access to basic data for research.

Belize

The National Meteorological Service (NMS):

Center for climate change. Part of the United Nations Framework Convention on Climate Change. (not visited).

Belize National Emergency Management Organization (NEMO):

Activity: Responsible for national emergency management and international assistance during disasters.

Need: There is a lack of opportunities to train staff in the country, they have to be trained abroad. Weak links with universities.

Costa Rica

Comisión de Prevención de Riesgos y Atención de Emergencias (CNE)

El Salvador

Servicio Nacional de Estudios Territoriales (SNET):

Activity: Data collection in geology/volcanology, hydrology, meteorology. To some extent analyses of data. Has been delegated responsibility for producing a Central American risk map of natural disasters. Good geographical information system (GIS) for presentation of data. Good collaboration with national universities.

Needs: Basic data are missing for the production of a Central American risk map. There is a lack of opportunities for higher education, a base for development of analyses methods.

Guatemala

Coordinadora Nacional para la Reducción de Desastres(CONRED):

Activity: Coordinates systems for risk analyses. Works to introduce nature-induced disaster mitigation into basic education. Has agreements with 4 universities in Guatemala to promote research and education.

Needs: Specialist with in-depth discipline competence. Research in urban landslide problems. Capacity building in natural disaster mitigation.

Instituto Nacional de Sismología Vulcanología Meteorología e Hidrología (INSIVUME):

Activity: Database for seismic, meteorological and hydrological data. Cooperates with University of San Carlos, University del Valle, University Rafael Andiver at which data are analysed. Works on seismic risk maps.

Needs: Seismic risk maps for the whole country. Technical personnel trained for working at local level with monitoring/planning and making technical data available to society. No official building code training for construction of seismic safe build-

ings. Lack of capacity for geotechnology, landslide and mud-flow problems. Climate change scenarios: models and how to use them.

Project: The Central American Bank (CABEI) funds modernizing of monitoring equipment in hydrology, meteorology and seismology.

Honduras

Comisión Permanente de Contingencias (COPECO) (Not visited):

The organization that coordinates the national system of prevention, mitigation and attention to emergencies and disasters caused by natural as well as anthropogenic hazards. Coordinates both public and private sectors.

Nicaragua

Instituto Nacional de Estudios Territorial (INETER):

Activity: Runs a seismic network for Nicaragua and an earthquake warning system. Tasked by CEPREDENAC with the responsibility to develop a tsunami warning system for the region.

Needs: In-depth discipline education. Groups of scientific managers to run projects.

Project: A number of internationally and local funded projects, one of which is seismic vulnerability of Managua.

Panama

Sistema Nacional de Proteccion Civil (SINAPROC) (Not visited):

Responsible for planning, study, supervision and organization of strategies and actions for prevention of material and physio-social hazards, and the evaluation of natural and anthropogenic induced hazards.

Other national organizations

El Salvador

Asociacion Nacional de la Empresas Provade (ANEP):

Comments: El Salvador very vulnerable, natural hazards, increasing population etc. Planning is difficult due to lack of political stability and strategic plans do not include risk of natural disasters.

Needs: In-depth disciplinary capacity is needed for applied solutions, rather than a broad general background in nature-induced disasters. The lack of national competence/credibility results in the hiring of external specialists.

7.4 Regional projects and organizations funding regional projects related to nature-induced disaster mitigation

Regional cooperation in Meteorology-Climate Change Scenario: Cuba, Mexico, Central America (UCR, Physics dept., Costa Rica).

A proposal for a global network on “Network for observations of Volcanic and Atmospheric Change” (NOVAC), which includes INETER, Nicaragua, OVSICORI-UNA, Costa Rica, and SNET, El Salvador.

A program on hydrology at CEPREDENAC in progress?

Banco Centroamericano de Integracion Economica (CABEI part of SICA):

supports INSIVUME, 15 MUSD for modernizing meteorological, hydrological equipment for monitoring, natural hazard prevention and to provide data for society.

COSUDE: supports an MSc program at UNAN Managua (CIGEO).

European Union: supports CEPREDENAC in risk management and water management (SICA will probably sign a project on 20 MEUR in November 2005). PhD and MSc training in meteorology and hydrology for the region.

IDB: supports the program Plan Puebla Panama (PPP), a regional project on infrastructures to promote investments in southern Mexico and Central America.

Nature-induced disaster mitigation is a part of the program.

IDRC and Sida: supports a program-Latin American and Caribbean Environmental Economics Program (LACEEP), in which CATIE is a part. The program aims at strengthening the capacity of researchers, teachers and policymakers to undertake economic analyses of environmental problems and policies. The training is through short courses, workshops and supervised research projects.

JICA: supports UCA-El Salvador on seismic vulnerability in villages.

Sida/Norad: planning support to CEPREDENAC for updating of the Regional Plan for Reduction of Disasters (PRRD). If the outcome is positive, long term support to CEPREDENAC may be possible.

UNDP-Spain: support to CEPREDENAC for training in natural disaster mitigation.

US aid: supports Centro de Augua del Trópioco Húmedo para America Latina y el Caribe (CATHALAC) (and the ministries of environment in C-A) in a regional program with National Aeronautics and Space Administration (NASA) on satellite data and how to use these data, includes training.

7.5 Organization and function of a Regional Research Council: a draft proposal by CSUCA

Perfil de Proyecto¹ para la Integración del Consejo Centroamericano de Investigación Científica, Cocic

1. Introducción

2. Objetivos:

1. Fortalecer la capacidad de investigación científica y de adaptación tecnológica de las universidades y los países de América Central
2. Apoyar la realización de investigaciones científicas y de adaptación tecnológica que contribuyan al desarrollo de los países de América Central, para mejorar la calidad de vida de sus habitantes.

3. Fondo Internacional para la Investigación Científica Centroamericana

Este fondo será aportado por SAREC/ASDI y su administración estará a cargo del Consejo Centroamericano de Investigación Científica COCIC y el CSUCA. Se procurará que a este fondo contribuyan además los Organismos Nacionales de Ciencia y Tecnología de los países centroamericanos (ONCYTs) y otros organismos idóneos de cooperación internacional.

¹ Segundo borrador al 11 agosto 2005

4. Composición y perfil de los miembros del Consejo Centroamericano de Investigación Científica:

El Consejo Centroamericano de Investigación Científica COCIT estará formado por personas de reconocida idoneidad provenientes de 4 sectores: La gestión de la investigación en las universidades públicas, la gestión de la investigación en las universidades privadas, la gestión de la investigación en los organismos nacionales de ciencia y tecnología y la realización de la investigación en la región. Se procurará que en la medida de lo posible los miembros del COCIT provengan además de diversos países de América Central.

La composición del COCIT propuesta es:

- 4 Vicerrectores de Investigación (y Postgrado) de las universidades miembros del CSUCA de diferentes países.
- 2 vicerrectores de investigación o su equivalente de universidades privadas invitadas por CSUCA y SAREC/ASDI
- 2 representantes de los Organismos Nacionales de Ciencia y Tecnología de los países de Centroamérica ONCYTs.
- 1 investigador muy destacado de la región centroamericana

En total 9 miembros

Los miembros del Consejo Centroamericano de Investigación Científica tendrán al menos el siguiente perfil:

- Poseer el grado de Doctor (PhD)
- Tener experiencia en la gestión de la investigación (excepto el miembro investigador, para quien este requisito será solamente deseable)
- De reconocida capacidad y experiencia en su campo disciplinario y profesional
- Con experiencia en actividades de índole regional centroamericana.
- De reconocida honorabilidad

5. Consejo Consultivo del COCIC

El Consejo tendrá además un comité consultivo internacional constituido por un representante de SAREC/ASDI, un representante del CSUCA, un representante del Consejo Centroamericano de Acreditación de la calidad de la educación superior CCA y representantes de otros organismos que contribuyan como donantes al Fondo para la investigación científica centroamericana que estaría a cargo del Consejo.

6. Comités Científicos de apoyo

Para su labor, el COCIC será apoyado por comités científicos permanentes enfocados en diferentes áreas de conocimiento. Cada uno de estos comités estarán constituidos por 2–3 personas de muy reconocida experiencia en la investigación científica de su respectiva área de conocimiento, provenientes de distintos países de la región.

Se prevé la existencia de los siguientes Comités:

Comité de Ciencias Naturales y Exáctas

Comité de Ciencias Sociales y humanidades

Comité de Ingeniería y Tecnología

Comité de Ciencias de la Salud

7. Procedimiento de elección de miembros del COCIC

Los 4 vicerrectores de investigación de las universidades miembros del CSUCA pueden ser electos en el seno del Consejo Director del SICAR, o en una reunión de Vicerrectores de Investigación de las universidades miembros del CSUCA convocada especialmente para el efecto, sobre la base de los criterios y procedimientos que el CSUCA decida.

Los 2 vicerrectores de investigación o equivalentes de las universidades privadas serían electos por los Rectores de las universidades privadas que el CSUCA y SAREC/ASDI decidan invitar a participar en este proceso. La selección de las universidades privadas que participarían en la elección sería con base en su historial en materia de investigación. Se estima que el grupo de instituciones a ser invitadas puede resultar pequeño, quizás no más de 10 universidades privadas de toda la región.

Los 2 representantes de los Organismos Nacionales de Ciencia y Tecnología de los países de la región deberán ser electos bajo la coordinación y responsabilidad de CETECAP.

El investigador de la región que formará parte del COCIC será seleccionado por el pleno de los 8 miembros del Consejo provenientes de los 3 sectores anteriores. Ellos decidirán los criterios y el procedimiento que utilizarán para seleccionar al noveno miembro del Consejo.

Los miembros del COCIC durarán en sus puestos por períodos de 4 años. Podrán ser reelectos por una única vez. Para evitar que todos los miembros del Consejo sean reemplazados al mismo tiempo, la mitad de los primeros miembros durarán en sus funciones por 6 años. La selección de los miembros que durarán 6 años será decidida por el pleno de los miembros del Consejo.

Los miembros de los comités científicos de apoyo serán nombrados por el pleno del COCIC, por períodos de 4 años. También podrán ser redesignados para un nuevo período por una única vez y la secuencia de su nombramiento/reemplazo será de la misma manera que en el caso de los miembros del Consejo.

8. Secretaría y administración

La Secretaría del CSUCA actuará como Secretaría del Consejo Centroamericano de Investigación Científica. Teniendo a su cargo además la administración del Fondo Internacional para la Investigación Científica Centroamericana cuya utilización será conducida por el COCIC.

9. Funciones

a) Funciones del Consejo

- Definir las políticas, lineamientos y planes del COCIT para promover y apoyar la investigación científica y de adaptación tecnológica en la región.
- Convocar a los académicos centroamericanos a la presentación de proyectos de investigación que puedan ser apoyados por el Consejo.
- Seleccionar los proyectos de investigación que serán apoyados por el Consejo Centroamericano de Investigación Científica.
- Dar seguimiento a la ejecución de los proyectos de investigación apoyados por el Consejo.
- Nombrar a los miembros de los Comités Científicos de Apoyo
- Conocer y aprobar el presupuesto anual del COCIT
- Conocer y aprobar los informes financieros auditados de la ejecución del presupuesto anual del COCIT

- Realizar cursos de capacitación para investigadores de la región
- Realizar simposios regionales e internacionales de investigación científica.
- Publicar resúmenes de informes de investigación científica realizadas con apoyo del COCIT.

b) Funciones de la Secretaría

- Actuar como la Secretaría Ejecutiva del COCIC
- Bajo las directrices del COCIC, efectuar la administración y por tanto también la rendición de cuentas del uso del Fondo Internacional para la Investigación Científica Centroamericana
- Procurar adicionar nuevos donantes para el Fondo Internacional para la Investigación Científica Centroamericana.

c) Funciones de los Comités Científicos de Apoyo

- Evaluar y dictaminar sobre los proyectos de investigación sometidos a su consideración por el COCIC.
- Preparar documentos técnicos y académicos requeridos por el COCIT relacionados con su respectiva área de conocimiento.

10. Personería jurídica

En sus primeros años de funcionamiento, el Consejo Centroamericano de Investigación Científica funcionará amparado en la personería jurídica del CSUCA. Siendo que el CSUCA es un organismo universitario regional centroamericano de muy larga trayectoria que, como tal, cuenta con estatus de misión internacional en Guatemala. Estatus que le proporciona existencia jurídica y prerrogativas propias de un organismo internacional reconocido por el Estado Guatemalteco (exoneración de impuestos a la institución, estatus de MI para sus funcionarios no guatemaltecos, etc.). Asimismo es reconocido por el Sistema de Integración Centroamericana -SICA- como un organismo de integración regional.

Al lograr su desarrollo y consolidación institucional, si así lo considera oportuno, el Consejo Centroamericano de Investigación Científica, con el apoyo del CSUCA gestionará su propia personería jurídica como organismo regional centroamericano.

11. Plazo y productos esperados

12. Presupuesto

Rubros a considerar para el presupuesto:

1. La alimentación anual del Fondo Internacional para la Investigación Científica Centroamericana.
2. El costo de 2 reuniones ordinarias por año del COCIC
3. El costo de 2–3 reuniones ordinarias por año de los Comités Científicos de Apoyo
4. Costo del sitio web, sistema electrónicos de información y bases de datos del COCIC (equipo, software, mantenimiento)
5. Costo de Medios para agilizar las telecomunicaciones de los miembros del COCIC, Secretaría del CSUCA y miembros de los Comités Científicos de Apoyo para su trabajo conjunto a distancia (equipo y software para comunicaciones video telefónicas vía IP).
6. Personal de apoyo para: contabilidad, telemática y asistencia a labor de Secretaría Ejecutiva para COCIC y sus comités científicos de apoyo

7. Publicaciones y divulgación (convocatorias publicas a presentación de proyectos, folleto de presentación corporativa de COCIC, publicación con políticas, lineamientos y planes del COCIC, resúmenes de informes de investigación, directorios de proyectos de investigación e investigadores, etc.).
8. Cursos de capacitación a investigadores y gestores de la investigación (en formulación, gestión y ejecución de proyectos de investigación, etc.).
9. Simposios regionales e internacionales de investigación científica.

7.6 Bibliography, references

Arguello, M. y Lavell, A. "Reflexiones sobre Internacionalización y Globalización y su Incidencia en los Patrones de Riesgo en América Latina". Revista Quórum, Universidad de Alcalá, España. 2001.

Balikie, P., Cannon, T., Davis, I., Wisner, B. Vulnerabilidad: El Entorno Social, Político y Económico de los Desastres. 1996. <http://www.desenredando.org/public/libros/1996/vesped/index.html>

Badilla Coto, E., van Westen, C.J., Kingma, N.C. (2003) Evaluación de la Amenaza y causas de inundación en la ciudad de Turrialba, Costa Rica. En: Revista Geológica de América Central, 28(2003)Junio, pp. 91–108

Bermúdez Ch., Marlene. Vulnerabilidad social y organización ante los desastres naturales. En. Revista de ciencias sociales. 1993.

Campos. Armando. Educación y Prevención de Desastres. La Red. 2000. <http://www.desenredando.org/public/libros/2000/eypd/index.html>

Cardona, O. M. Evaluación de la amenaza, la vulnerabilidad y el riesgo. Elementos para el ordenamiento y la planificación del desarrollo. 1995.

Cardona, O. M. Manejo ambiental y prevención de desastres: dos temas asociados. 1995.

Cardona, O. M. Prevención de desastres: Estrategia para el desarrollo sostenible. 1994.

Cardona, O. M. Prevención y atención de desastres, Aspectos fundamentales sobre mitigación de riesgos y preparativos para desastres. Universidad de los Andes. Memorias de Seminario, Bogotá. Junio. 1996

Cardona, O.D. Holistic Approach to Urban Seismic Risk Estimation. 7th National Conference on Earthquake Engineering, 7NCEE, July, 2002, Boston. U.S.A. 2003.

Cardona, O.D. The need for rethinking the concepts of vulnerability and risk from a holistic perspective: a necessary review and criticism for effective risk management. Chapter 3 of book: mapping Vulnerability. Edited by G. Bankoff, G. Frerks and D. Hilhorst, Earthscan, Netherlands. 2003. http://www.desenredando.org/public/articulos/2003/nrcvrfhp/nrcvrfhp_ago-04-2003.pdf

Cardona, O.M., Lavell, A., Mansilla, E. y Moreno, A.M. Estudio preliminar: Avances en las estrategias de desarrollo institucional y sostenibilidad financiera de la gestión del riesgo de desastres en América Latina y el Caribe. Documentos de Trabajo para Diálogo Regional de Política. BID. Junio 13 y 14, 2005. <http://www.iadb.org/int/DRP/esp/Red6/Docs/Cardona06-05esp.pdf>

CATIE.Reducing The Vulnerability Of Central America To Natural Disasters By Improving Agriculture And Natural Resource Management. CATIE's Perspective and Possible Areas for Intervention. 1999.

Guendel, F. and Kulhanek, O., 2000. A proposal for a post-graduate school on the natural disaster mitigation in Central America (NADIMCA).

NOVAC, 2005. Network for Observation of Volcanic and Atmospheric Change. Application by Bo Galle, coordinator.

Olguín, L., 2001. An overview study of the perception by Central American Institutions about the creation of a regional postgraduate programme in natural disaster mitigation (NADIMCA). San José, Costa Rica, July, 2001.

Lindroos, M., 1997. Avslutande stöd till seismologisk forskning och forskarutbildning i Centralamerika. Insatspromemoria, Sida/SAREC, dnr:1995-0213.

Tröften, P-E, 2001. Support to long terms research capacity building related to natural hazards in Central America. Insatspromemoria, including reviews of the NADIMCA proposal, Sida/SAREC, dnr: 2000-001-001495.

Halving poverty by 2015 is one of the greatest challenges of our time, requiring cooperation and sustainability. The partner countries are responsible for their own development. Sida provides resources and develops knowledge and expertise, making the world a richer place.



SWEDISH INTERNATIONAL
DEVELOPMENT COOPERATION AGENCY

SE-105 25 Stockholm Sweden
Phone: +46 (0)8 698 50 00
Fax: +46 (0)8 20 88 64
sida@sida.se, www.sida.se