A proposal for a Post-Graduate School on the **Mitigation of Natural Environmental Hazards in Central America**

Preamble

The isthmus of Central America is systematically exposed to a great number of rapid-onset natural disasters such as earthquakes, volcanic eruptions, landslides, hurricanes etc. The impact of these calamities upon population and further socio-economic development is often catastrophic (cf the Mitch hurricane of 1998). Also the potential loss is steadily increasing due to increasing urbanization, industrialization and infrastructure complexity. There are no means to prevent natural disasters from occurring. However, by better understanding the processes generating and accompanying these disasters, we can save lives, reduce economic losses and the degradation of the environment.

Since 1992, SAREC/SIDA is funding (with minor contribution from NORAD) a project entitled *Seismotectonic Regionalization of Central America, SERCA*. The main objective of this project is to train seismological personnel on all levels to be able to perform various tasks associated with seismic hazard assessment. To date, there are about 35 graduates who passed a 6-month graduate course in seismology and by the end of 2000 there will be a dozen seismologists in the region with MSc or PhD degrees from Uppsala and/or Bergen. Even though earthquakes may be considered as the greatest hazard for life and well being on the planet, they represent only one category from a list of natural disasters.

The SERCA project will end in December 2000. All tasks formulated at the beginning of the project are being fulfilled and valuable experience has been acquired to run similar projects.

The Proposal

Studies and management of natural disasters are becoming an increasingly broad and interdisciplinary profession. They require contributions from a number of disciplines such as geophysics, geology, statistics, construction engineering, emergency management, etc. As of this writing, in Central America, there is no university with a corresponding curriculum. We

therefore, propose to establish a school (hereafter, School) in Central America with a Masters Degree Programme in Mitigation of Natural Environmental Hazards. The School will focus on *knowledge production* as well as on *research training,* which in this context should be viewed as two complementary components of the proposal. The main objective of the School will be a sustainable *capacity building* furnishing respective governments with competence to reduce natural catastrophes in the region. One immediate beneficiary of the School would be to provide direct expertise (recognize and deal with natural hazards) to urban and regional planning authorities, insurance companies, relief agencies, etc working in Central America.

Our society today, requires more than ever that local authorities take preventive and mitigating measures regarding the occurrence of natural disasters *before* these disasters take place. Although in many cases forecasting and prediction of hazardous natural phenomena is not yet possible, in other cases it is feasible to prepare the population and protect the infra-structure. Since natural catastrophes do not recognize national borders, the approach must materialize on a regional rather than national scale. Covering the whole Central America will increase the amount of information, number of specialists involved, number of case studies and consequently will lead to better results. The size of the isthmus, comprising six countries, seems to be manageable for the goal and the demarcation of the area is quite natural with respect to its history and cultural heritage.

Student Profile

It is expected that the students graduating from this Programme will be able to contribute to the recipient country by interacting both with the local scientific community and authorities. This interaction will provide timely solutions in areas where potential natural- and man-made disasters can be triggered by the action of natural phenomena. It is clear, in many instances, that it is the action of man that triggers large-scale catastrophes, with substantial loss of life and severe economic impact to the town, city or country. The Programme will then focus on learning not only the specifics of the physical processes of natural phenomena, but also the social aspects of these matters. The enrolment may comprise about 10 MSc students per year, so that at any time there may be about 20 students at the school.

Structure of the graduate programme

The degree programme is planned for two years. The first year, i.e. two semesters, will consist of full-time course work. During the first semester, all students will undertake a core of courses designed to homogenize as much as

possible the different previous educational backgrounds in which they obtained their Bachelor Degrees (required to enter the programme). During the second semester, the student will select courses from a list of courses designed for the field of specific interest (landslides – e.g. geology and soil conditions; floods – e.g. hydro-meteorology; volcanoes – e.g. hazard mapping; earthquakes – e.g. risk assessment, paleoseismology) and which will range from basic to intermediate level. This part of the curricula will be offered to large extent at the Universidad Nacional of Costa Rica. During the first year, students will also establish or strengthen the horizontal links, which are of great importance for their future work within the region. Prominent lecturers, from overseas but also from the region, will be invited to give lectures to the first-year students. The student shall sit for examinations at the end of each of the two first semesters.

The first year of the master programme will provide the student with enough knowledge to continue into the second year devoted to a research project (and a few advanced courses if necessary) documented by a MSc Thesis, defended at the end of the second year. A supervisor, usually a senior researcher, will be allocated to each second-year student. Due to the widely different specializations, second-year students will join institutes scattered geographically over the whole region.

The use of the Geographical Information Systems, GIS, will be greatly enhanced as a tool for providing means of communicating results. We believe that through the use of GIS, the student will be able to display, in simple terminology, her/his findings to local authorities and/or governmental organizations. This will allow for better contacts between the scientists and authorities, usually blamed as the major stumbling block for obtaining meaningful results.

The administrative center

With respect to the inherited interdisciplinary and international character of the Programme and to the wide network of participating units (universities, research institutes, governmental organizations in the region and their Swedish counterparts), the School must have an administrative center. We propose that Universidad Nacional de Costa Rica will function as the center for the Programme. Through the established channels, i.e. the Office of Academic Affairs and the University Foundation (FUNA), administrative and financial aspects of the School will be programmed, executed and monitored. Currently, the SERCA Project is receiving a substantial and much appreciated assistance from FUNA on all financial and budget matters.

The Office of Academic Affairs will undertake the tasks concerning the organizational items of the Programme. For example, the inscription and recognition of the Programme through the National Council of Rectors (CONARE) and through the Central American Federation of Universities (CSUCA) will be a task undertaken by this office. These actions will guarantee the recognition of the Graduate Diploma, to be awarded by Universidad Nacional de Costa Rica, throughout the region (cf Appendix). In a parallel effort, FUNA will conduct the management of the funds provided by external sources as well as those from the region.

Time scheme

To establish favorable conditions for a successful functioning of the School will require a close co-operation of a number of disciplines at different institutions and hence the volume of work to be executed becomes much larger when compared with that of the SERCA project. To build a common constructive culture from a number of separate elements may take several years. We therefore suggest planning initially the activities for two 5-year periods. During the first period (i.e. 5 years) we request full financial support from SIDA/SAREC. This will be the phase during which the consolidation of the Programme should be reached. After this introductory phase, a second phase will commence with a transition period (approx. 5 years) during which the support from SIDA/SAREC will gradually decrease, while the regional institutions will step-by-step assume full financial responsibility. It is expected that by the end of the project (approx. after 10 years) regional experts will chair the activities (possibly with assistance of selected experts from overseas) and the region will solely be responsible for the Programme. After this time, we hope to maintain minor financial support from SIDA/SAREC for short-term (3 to 6 months) scholarships for visits to Sweden by Programme graduates and other researchers.

Budget

The following costs should be considered in the final budget:

1- Scholarships (i.e. transportation, housing, living expenses, field trip expenses, etc.)
2- Fees for tutors and professors, including field expenses, etc.
3- Renting of office space and administrative costs (i.e. faxes, phones, internet, etc.)
4- Complimentary equipment to support local research facilities
5- Yearly coordinating meetings (tutors, students, administration, etc.)
6- Follow-up visits of graduated students to Swedish counterparts
7- Other

Appendix

Data Base. An integral part of the project will be the establishment and maintenance of a database comprising also information regarding persons and institutions in the region that can contribute to the strengthening of the Programme. An inventory of specialists and research groups, within CSUCA, will be conducted. In this way, we can provide a comprehensive list of qualified personnel and facilities for different natural phenomena as well as for corresponding measures of preparedness and disaster reduction. This task will be initiated in the beginning of year 2000, prior to the presentation of the final proposal to SIDA/SAREC. We hope to establish personal and institutional contacts with individuals and groups who are actively conducting advanced research and studies on natural hazards. We believe that at this stage, support from Swedish counterparts, i.e. from universities and other organizations, will provide valuable input into the management of the proposed Programme.

Follow-up activities. The basic idea of a regional programme like the one proposed here, resting on the experience gained during 8 years of the SERCA/SAREC project, is to build a truly regional and integrated mechanism for the management of natural disasters. Examples such as the recent hurricane Mitch and/or large earthquakes, which transcend national borders, require rigorous regional coordination. The aim of our programme is to establish a group of scientists facing natural disasters as a common problem for the entire region. Horizontal cooperation among the scientists will be one of the major goals of the Programme. This issue will be addressed by providing, once the student finishes her/his degree, small grants (i.e. seed money) to promote research studies under the scheme of horizontal cooperation with at least two countries involved. We also propose to establish follow-up visits to Sweden by students, which can interact, on specific topics with Swedish counterparts (e.g. writing a research paper, or a summary of conclusions to be presented to a local authority and/or government). Annual Workshops, to review the results achieved and to plan for future activities, will be organized in the region.

Graduate diploma. Discussions as to who should provide the Academic Degree by the end of student's second year, has to be addressed. We believe that the degree should be awarded by Universidad Nacional of Costa Rica, in conjunction with the University where the student finishes his or her thesis. This will guarantee that, by inscribing the Programme within the CSUCA structure, all degrees awarded will be recognized by all Central American countries. This scheme will impose certain conditions

and rules under which the support from the other components of the project, on a regional level, is negotiated. We will take the opportunity, of establishing during the year 2000 (last year for the current SERCA/SAREC project) space for discussion on this subject. The idea is to make the Programme the least bureaucratic possible, i.e. with the least administrative costs.

Extension of the region. We also suggest to consider an extension of the area of student recruitment by including the Caribbean and northern South America (e.g. Venezuela, Colombia and Ecuador).

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Dr. Federico Güendel
SERCA Project
Regional Coordinator

Dr. Ota Kulhánek
SERCA Project
Scientific Coordinator

LOS AUTORES

Richard Stuart Olson es profesor de Ciencias Políticas y profesor titular de la Fundación We Will Rebuild (WWR) en el Centro Internacional de Huracanes de la Universidad Internacional de Florida en Miami.

Juan Pablo Sarmiento, médico, es funcionario de Proyectos Especiales de International Resources Group, Inc. (IRG) para la Agencia Norteamericana para el Desarrollo Internacional, Oficina de Asistencia en caso de Desastres en el Extranjero (USAID-OFDA), y trabaja en Bogotá, Colombia.

Robert A. Olson es presidente de la firma Robert Olson Associates, de Folsom, California.

Vincent T. Gawronski es profesor adjunto de Ciencias Políticas y miembro del grupo de Investigación Post-Doctoral en el Centro Internacional de Huracanes de la Universidad Internacional de Florida en Miami.

Amelia Estrada es estudiante de posgrado del Centro para América Latina y el Caribe, y ayudante de investigación del Centro Internacional de Huracanes de la Universidad Internacional de Florida en Miami.