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Natural disaster mitigation and cultural heritage: a course proposal

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This paper proposes the development of a tertiary education course 'Natural Disaster Mitigation and Cultural Heritage' designed to develop common ground between the disaster mitigation agencies on the one hand and the cultural heritage managers on the other. The course, to be taught solely in distance education mode, is designed as a stand-alone unit, both a professional development course and as a subject in a disaster management course.

The need for a course

Every natural disaster has an impact on the built environment: many buildings and structures are affected, while some are damaged to a varied degree. The demolition, however, is not confined to the disaster effect, but extends to the impact of the disaster managers as well. The aftermath of the Loma Prieta Earthquake has shown that many heritage buildings had been 'red-tagged', declared to be unsafe and were subsequently demolished as a public safety exercise. In most cases, little or no assessment of their historic significance had been carried out and little effort made to find means to conserve and restore these sites (Nelson 1991). In many cases, developers and some property owners actively seized upon the opportunity to rid themselves of heritage-listed properties. An almost identical scenario, albeit on a smaller scale, was played out in Newcastle, Australia (Henry 1991).

It has been asserted many times by numerous speakers at the symposium that there is substantial need for public education and that the parties involved in disaster mitigation

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efforts should have the appropriate skills and an understanding of the major issues and procedures of cultural heritage management.

Other disaster management courses

A number of universities, both in the United States and Canada as well as in Australia, offer disaster management courses, either as full-length tertiary courses or as single subjects and professional development course units. These courses focus on the common training needs, such as disaster relief, hazard reduction, human resource management and the like. A compilation by the Natural Hazards Center in Colorado (Blanchard 1995) lists the following providers for the Americas (Table 22.1).

Table 22.1. Disaster management course providers in the Americas

Canada	
University of British Columbia	
United States of America	
Arkansas State University	St. Petersburg College
California Specialized Training Institute	Tennessee Technological University
California State University, Long Beach	Texas A & M University
California State University, Los Angeles	Texas Tech University
California State University, Chico	The City University of New York
California State University, Fullerton	The Graduate School of America
Cincinnati Technical College	Thomas Edison State College
Clark University	University of California at Berkeley
Eastern Michigan University	University of Colorado
Florida State University	University of Delaware
Front Range Community College	University of Denver
Frontier Community College	University of Houston
Garland County Community College	University of Kansas
George Washington University	University of Maryland
Georgia State University	University of Massachusetts
Hampton University	University of Miami
Indiana Public Safety Training Institute	University of Michigan-Flint
Lewis and Clark Community College	University of North Texas
New Mexico State University	University of South Carolina
Pennsylvania State University	University of Southern California
Red Rocks Community College	University of Toledo
Rochester Institute of Technology	University of Utah
Saint Joseph's University	University of Wisconsin
Southern Illinois University	Washington University

In addition, the following providers for Australia need to be considered:

- Associate Diploma of Emergency Management (University of Tasmania)

- University of New England
- Queensland University

Whilst some of the cultural resource management needs are addressed in passing in some of the units making up these courses, none of these courses dedicate a *full* subject (unit) to the needs of cultural heritage resources. It is evident then, that the common course offerings do not address the safeguards of cultural heritage resources. As a result there is an information gap, which leads to the disregard of cultural resources in the event of natural disasters and there is a potential for conflict. A good avenue to reduce the level of conflict is to facilitate the communication between the conflicting stakeholders. This can be achieved by the provision of a fully accredited university-level training course.

The professional development market

The market for such a course consists of both disaster management professionals and cultural heritage managers. The following categories of professionals form the primary market of the proposed course (in alphabetical order):

- Building inspectors
- Cultural heritage managers
- Federal/State disaster and emergency managers
- Fire officials
- Historical architects
- Insurance assessors
- Local government officials
- Local preservation staff
- Park Service preservation specialists
- Park Service superintendents
- Park Service wild fire/bush fire managers
- State Historic Preservation Office (SHPO) staff
- Structural engineers
- Town planners

The course is not intended to replace the skills and long experience of professionals, such as building code inspectors or historic architects, but shall provide a conceptual framework in which these professionals should operate and, most importantly, cooperate.

The undergraduate market

In addition, the standalone course can form a single unit or subject in an undergraduate course. It is projected that the subject be offered not only at Charles Sturt University, but also by a partner in the United States.

If the course is offered (predominantly) as an undergraduate subject in, say, Spring and offered as a (predominantly) professional course in Autumn, the subject can be offered all year round, giving additional flexibility to professionals and undergraduates alike.

It is anticipated that the subject can, if properly marketed, form a viable alternative as an elective subject in those degrees which allow flexibility in their structure.

Course structure and content

The course is scheduled to take six months to complete at a 0.25 study load. The educational structure underpinning the course (see below) espouses a learner-centered, problem-centered, resource-based learning environment. This allows students to progress *at their own* determined speed through the learning materials provided. While the 0.25 study load is the scheduled rate of progress, faster rates of progress are likely to become the norm.

The entire structure of the course has been designed on a fully modular basis, so that individual modules can be developed to cater for the specific needs of an audience without the need to re-write the whole subject package. For example, the subject needs to be of use both to the professional disaster manager *and* to the cultural heritage professional. The structure as envisaged would comprise of the following nine sequential modules, of which a student would need to study seven:

1. Module DIS/1: Introduction
2. Module DIS/2: What are Cultural Heritage Resources?
3. Module DIS/3: What are Natural Disasters?
4. Module DIS/4: The legal dimensions
5. Module DIS/5: Vulnerability of cultural heritage to natural disasters
6. Module DIS/6: Case studies - Geohazards
7. Module DIS/7: Case studies - Climatological hazards
8. Module DIS/8: Case studies--Human-induced hazards
9. Module DIS/9: Planning for Disasters

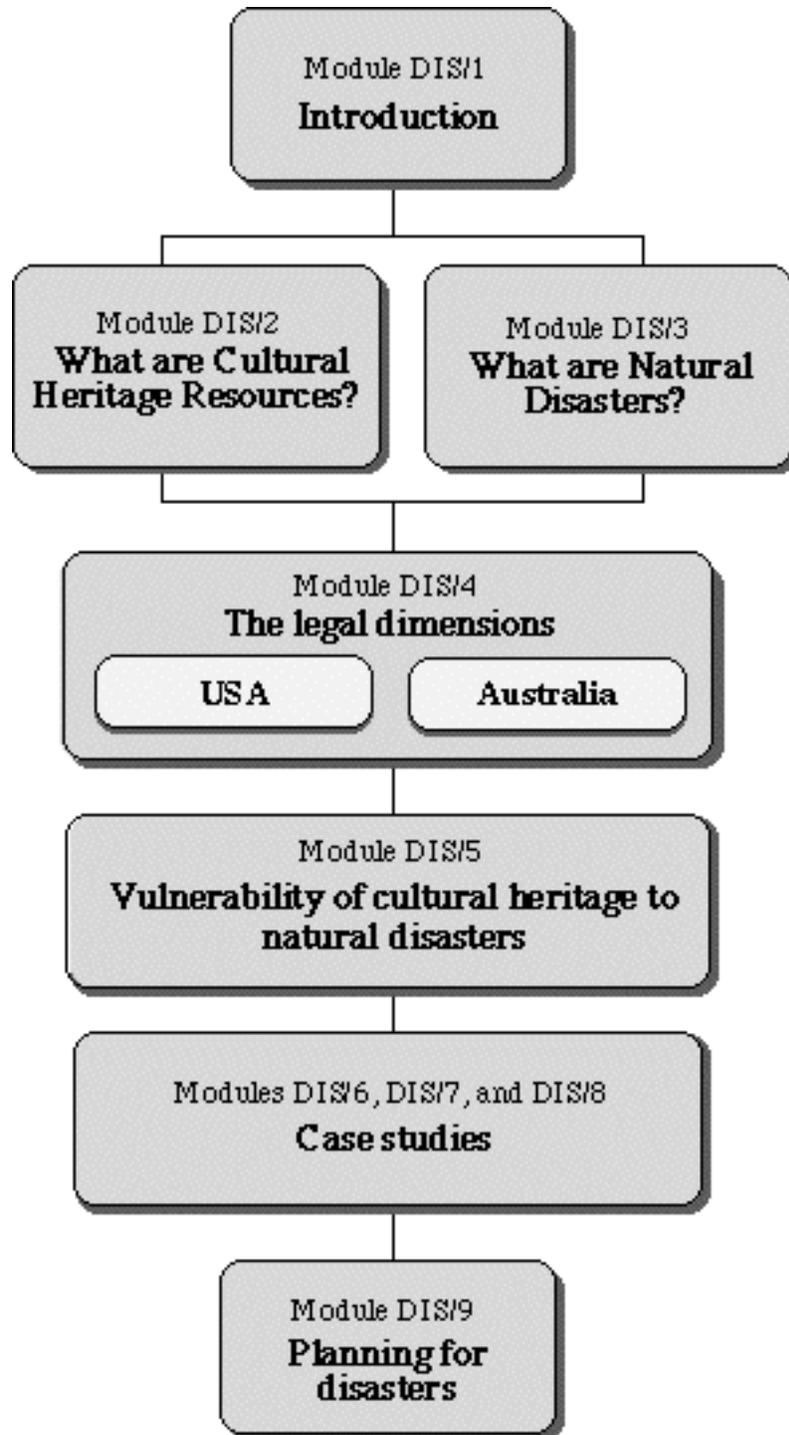


Figure 22.1. Structure of the course 'Natural Disaster Mitigation and Cultural Heritage'

Regardless from which background the prospective student or trainee comes from, he or she will start off with Module one, which sets the scene, and then choose either Module 2 or Module 3, depending on what specific knowledge is required. The student will be asked to answer an electronically marked pre-test to assess his and her knowledge level. Both streams will complete Module 4 and Module 5. Students will then choose two of Modules 6

(geohazards), 7 (climatological hazards) and 8 (human-induced hazards). Each of these modules has further options from which the students can choose. All students will then complete a disaster management plan in module 9.

Module DIS/1: Introduction

The introductory module will set the scene and provide a ‘road map’ for the student to provide him or her with an orientation before delving into the detailed subject matter. Also, it will include a series of self-assessments and electronically marked-up tests to allow the student to determine the level of pre-existing knowledge.

The objectives are to establish, by means of a few case examples, the potential for conflict between natural disaster managers and cultural heritage managers, and the need to find common ground on which communication can occur.

Module DIS/2: What are Cultural Heritage Resources?

This module is targeted at the natural disaster managers and the planners who are less familiar with the nature and objectives of cultural heritage management. The module will address the nature of cultural resources and will cover the concepts of cultural heritage management, from the identification and documentation of the resources to their evaluation and eventual listing. The module will include discussions on archaeological sites, the built environment as well as items of material culture and will address the issue of the variability of values and the matter of the scarcity and unrenewability of these resources.

Module DIS/3: What are natural disasters?

This module targets the cultural heritage managers and familiarizes them with the nature of natural hazards and the objectives of natural disaster managers before, during and after a disaster event. This module will deal with geohazards and technological hazards, their nature, frequency and general impact on the environment. Each type of hazard will be addressed comprehensively but succinctly. An in-depth treatment of the individual hazards and their impacts on cultural resources will occur in Module 6. Module 3 shall provide the student with a comprehensive understanding of the physical and meteorological parameters causing and governing geohazards, and shall address the concept of risk management.

Module DIS/4: The legal dimensions

This module should address issues such as the legal and administrative parameters governing the cultural heritage management agencies on the one hand, and the disaster management agencies on the other. It is this module which needs to be country-specific, as the legislation and the interpretation of these laws differs. Necessary is an overview on:

- the legislative mandate of the federal & state Emergency Management Authorities;
- the organizational/divisional structure of the federal & state Emergency Management Authorities;
- the mission(s) of the federal & state Emergency Management Authorities regarding cultural heritage;
- the policies of the federal & state Emergency Management Authorities regarding cultural heritage;

- the procedures and guidelines of the Emergency Management Authorities regarding cultural heritage;
- the legislative mandate of the federal & state Heritage Management Authorities;
- the organizational/divisional structure of the federal & state Heritage Management Authorities;
- the mission(s) of the federal & state Heritage Management Authorities regarding natural disasters;
- the policies of the federal & state Heritage Management Authorities regarding natural disasters.

In the case of the US module (Module 4 [US]), this would be *inter alia*:

- the structure of the Stafford Act;
- the mandate of FEMA;
- the structure FEMA uses to comply with its mandate;
- the mandate of State Emergency Management Authorities;
- the structure State Emergency Management Authorities use to comply with their mandate;
- the structure of the Historic Preservation Act;
- the mandate of the National Park Service;
- the administrative structure of the NPS and the SHPO's use to comply with their mandate;
- Secretary of the Interior's Standards for Rehabilitation of historic structures;
- the structure of the local heritage management agencies.

In the case of the Australian module (Module 4 [Aust]), this would be *inter alia*:

- the structure of the National Disaster Act;
- the mandate of the various state Emergency Services;
- the structure the SES use to comply with their mandate;
- the structure of the Australian Heritage Commission Act;
- the structure and mandate of the various state heritage acts;
- the structure and mandate of the local heritage management agencies.

Module DIS/5: Vulnerability of cultural heritage to natural disaster impacts

This module will address issues such as the *performance of various types* of cultural heritage (historic sites, landscapes, archaeological surface and sub-surface sites, rock art etc.), various constituent materials (wood, stone, brick, soil/adobe, textiles etc.) and structural systems (unreinforced masonry buildings, wattle-and-daub buildings, steel frame buildings etc.) in the face of the different disaster scenarios.

The common *impacts of disasters* are discussed, set out by type of cultural disaster and cross-referenced by type of resource, structural system and constituent materials. The hyper-media concept allows the student to follow through either avenue of learning.

The various *treatments and proactive measures* will be addressed, as well as the *dynamics of post-disaster actions* initiated by or taken up by the disaster victims.

Common *disaster mitigation techniques* are discussed, set out by type of disaster. What are the normal priorities of emergency response? What does this mean for historic properties? What are the logistical and operational requirements of the disaster response team? What does this imply for archaeological and heritage resources?

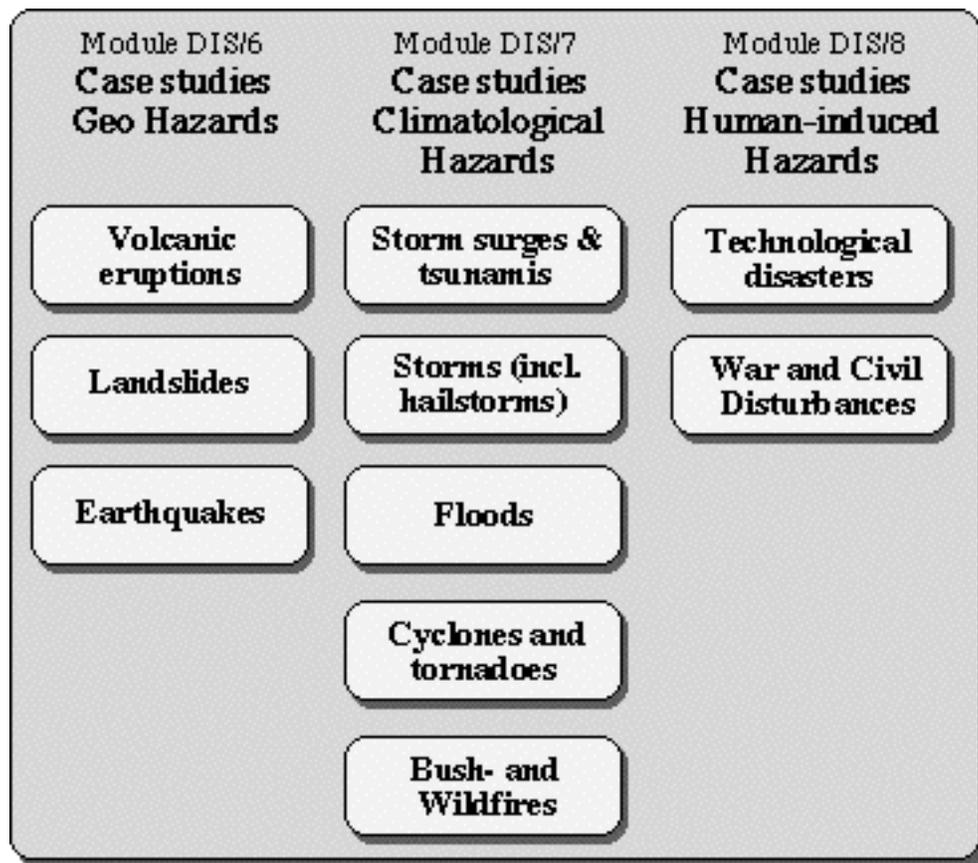


Figure 22.2. Students will select one case study each from two of the three modules.

Module DIS/6: Case Studies - Geohazards

There will be a set of modules developed for this module level, which will deal with a specific type of disaster and will address in greater detail the causes and development as well as the impact of the disaster on the cultural heritage sites. Projected are the following modules:

- Earthquakes (Module 6[a])
- Landslides (Module 6[b])
- Volcanic eruptions (Module 6[c])

Each of the case studies will make links, where appropriate, to other areas of study. For example, the effects of tsunamis are addressed in Module 7, even though they are triggered by submarine earthquakes or volcanic eruptions. It is anticipated that the sub-modules will come on line over the period of a year, starting with the most common, such as earthquakes.

Module DIS/7: Case Studies - Climatological hazards

There will be a set of modules developed for this module level, which will deal with a specific type of disaster and will address in greater detail the impact of the disaster on the cultural heritage sites. Projected are the following modules:

- Cyclones and tornadoes (Module 7[a])
- Storm surges and tsunamis (Module 7[b])
- Floods (Module 7[c])
- Storms (including hailstorms) (Module 7[d])
- Bushfires (Wildfires) (Module 7[e])

Module DIS/8: Case Studies - Human-induced hazards

There will be a set of modules developed for this module level, which will deal with a specific type of disaster and will address in greater detail the impact of the disaster on the cultural heritage sites. Projected are the following modules:

- Technological disasters (Module 8[a])
- Civil Disturbances and war (Module 8[b])

Even though the hazards included in this module are not natural disasters *sensu strictu*, many of their impacts resemble those of natural disasters. A good example is the bombing of the Murrah Federal Building in Oklahoma City, where the impact of the blast air wave had characteristics of that of cyclonic winds, and the impact of the seismic wave resembled, in part, that of earthquakes.

Module DIS/9: Planning for disasters

The final module will deal with the planning process for actions to be taken before, during and after a disaster. The student would be required to complete a disaster management plan for a specific (set of) cultural heritage place(s) and specific type of disaster, which has the greatest probability of occurring in the student's local area. This achieves a number of aims:

- it provides an assessable item for the successful completion of the subject/unit;
- it provides an applied assignment which is meaningful to the student; and
- it provides the student's employer organization with a draft disaster management plan.

The student is required to document that the plan will be workable by ensuring that appropriate communication lines have been developed, that there is stakeholder consultation on the matter and that the plan has been commented upon by at least both SHPO and the State Emergency Management Authority.

Mode of delivery

As the course is seen as a professional development option, and as hosting annual workshops is cost- and time-consuming for not only both the participants and their organizations but also for the institution hosting them, this subject package shall be delivered in external teaching mode (distance education) only. This will allow the student to complete the course at his or her own work/residential location and at the student's pace and leisure. Traditional distance education packages consist of a mail-out of course material, comprising subject outline, course/study notes and readings, often accompanied by a video tape. The set-backs of this 'traditional' mode of delivery for the purposes of this particular course subject are that, for reasons of cost, the visual images need to be kept to a few, and, for the most part, to black and white pictures.

The recent developments of server-based technology have seen the Internet become more and more pervasive. The 'information superhighway' has been touted far and wide as heralding a new age. Certainly the World Wide Web (WWW) offers a wide range of options for communication and for the exchange of information. Both individual pages of information and information exchange networks have been developed. As a result, it has become feasible to develop the course as an interactive multi-media program for delivery on the Internet/WWW which can be run 'live', downloaded to the user's PC or packaged on a CD-ROM. This approach allows for an abundance of color illustrations *and*, as well as live digital video footage to be included in the package, which can be accessed and manipulated interactively.

Charles Sturt University, as well as the author himself, has experience in developing such applications for distance education purposes (Spennemann 1995a, 1995b; Spennemann & Steinke 1995). To document the commitment to the electronic mode of delivery, this proposal has been written in Hyper Text Markup Language (HTML) and is posted on the World Wide Web at the following URL:

http://life.csu.edu.au/disaster/conf95/SFO_Course.html

The course delivery would tie in with the resources made available by and accessible through the proposed Special Interest Network on Natural Hazard Mitigation for Cultural Heritage Sites (Spennemann & Green this volume).

Educational underpinnings

The key principle of computer-driven interactive multimedia education systems is that the student is enabled to determine his or her own rate of progress through the subject matter and to conduct the self-training at self-determined intervals. With the inclusion of pictorial and audio material and the provision of multiple pathways or links, the student can effectively steer and navigate a route which will favor that particular student's mode of learning.

In general, the packages can be grouped into four classes (see below). There is a need for all four types of resources, depending on the particular learning outcome required, and none of these are the 'be-all-and-end-all' of computerized training.

Table 22.2. Classes of computer-assisted learning packages

Class	Type	Aim
I	'drill and practice'	mastery of methods/practices
II	'encyclopedia'	information resources for factual knowledge
III	'challenger'	imparting concepts and theory, thus challenging students
IV	'simulation'	application of methods, theory and factual knowledge

Multimedia *per se* do not result in increased learning and do not advance a student's understanding of the subject matter. Rather, the interactive mode of learning is the critical factor involved, as it allows the student to follow up various pathways influencing the individual learning outcome (Clark & Craig 1992).

The traditional university teaching concept entails a situation where the lecturer is in control of the information and the learning process in form of lectures and tutorials. An analysis of teaching a cultural heritage subject in an applied science context has shown that a student's migration from surface learning to deep learning is inhibited by a number of parameters, which need to be addressed systematically if the outcomes for the students shall improve:

- comfort thresholds of students to tackle challenging concepts;
- students' ability and preparedness to peruse library resources beyond the immediate need for the completion of assignment (Spennemann 1995c).

For the student's learning process, we would have to consider the following sequence:

Step 1)	Reception of ideas/information
Step 2)	Reformation of ideas integrating own experience
Step 3)	Exemplification of ideas integrating own experience
Step 4)	Generalizations from ideas
Step 5)	Generation of queries derived from ideas
Step 6)	Connections of ideas with the discourse

There is considerable literature on the cognitive parameters in relation to collaborative and problem-oriented learning and its embedding into a technological delivery framework (Soloway *et al.* 1995; Spitulnik *et al.* 1995), which shall not be reviewed here in any great detail.

The design of such packages must be centered on the learner and not the teacher (Soloway *et al.* 1995). Much of the multimedia design, such as self-guided text cum audio and still photo or text *cum* video combinations have been pre-packaged lectures and thus remain a teacher-centered design. We need to be careful not to confuse multimedia, which *sensu strictu* only means the combination of various media in one teaching package, with interactive multimedia, and interactive multimedia packages, where the student is prompted

with an array of options and where the student decides the direction the inquiry shall take. On the other hand, fully learner-centered design is project- or problem-based and allows a student to solve a given problem by drawing on a variety of resources and conducting simulated experiments. Resource-based learning implies that the student is offered the resources embedded in a navigational structure which facilitate progress.

Mode and extent of assessment

At various points in each module, the student will be asked to complete in-text (in-program) activities and self-assessments tasks, as well as knowledge reaffirmation exercises. These will comprise brief evaluations or multiple choice tests contained in forms submittable on the WWW. Once a test is posted, it will be automatically marked-up by the server and once graded will be returned to the student. At the end of each module, the student will complete another multiple choice test which, once posted, will be automatically marked-up by the server *and graded*. The results contribute to the students'/participants' final grade for the subject.

The student will be required to submit only one assessable written item, a disaster management plan (see Module DIS/9), for proof of subject completion. Submission of these items can either be by ordinary mail or, preferably, in electronic form as an e-mail attachment.

On-line tutorials

One-to-one discussion and tutoring can occur via e-mail exchanges, and as a group in a virtual tutorial setting. The main aim of a newsgroup is to encourage discussion among students. Newsgroups are a unique means to blur the distinction between on-campus and distance education students, as a virtual tutorial can be established in which exchange of information can take place, inclusive of students that may otherwise not participate. If the newsgroups are structured in a fashion that ex-students are required to participate, a dynamic can be developed which draws on a wide range of expertise in the field.

Practicalities

The following practicalities need to be considered: (i) teaching responsibilities and (ii) the accreditation of the subject as a professionally recognized standalone training course.

Teaching responsibilities

The teaching and marking responsibilities should be shared between the institutions offering the course and its modules. It is envisaged that such a course would be administered as a subject by one institution (such as Charles Sturt University) and cross-listed by at least one, preferably several, US distance education providers. It is anticipated that such a course will become available by July 1996 and will be listed as a formal subject of Charles Sturt University as part of the Bachelor of Applied Science (Parks, Recreation

and Heritage)¹ by January 1998 and the Bachelor of Social Science (Emergency Management)² by January 1998.

Accreditation

The course should be listed by one or more universities as a full subject in their degrees relating to cultural resource management, historic preservation or disaster management, which would allow a student to accrue credit towards a degree. As the subject matter has not been dealt with before in any depth, there is a need to have this subject fully accredited as a professional training and development course. In addition to accreditation through the relevant university bodies, it is suggested to register it inter alia through the following:

- American Association of Preservation Technology
- American Institute of Architects
- American Institute of Conservation Architects
- Australian Heritage Commission
- Australia ICOMOS
- Australian Archaeological Association
- Australian Emergency Management Institute
- Australian Society of Historical Archaeology
- Department of Conservation and Natural Resources (Victoria, Australia)
- Department of Environment and Heritage (Qld, Australia)
- Federal Emergency Management Agency (US)
- National Park and Wildlife Service (NSW, Australia)
- National Trust for Historic Preservation (US)
- National Trust of Australia
- US National Park Service
- USA ICOMOS

A viable option?

I believe such a course *is* a viable option. What we need to achieve is a general proprietary sense among everyone involved, that it may not be our individual property we are dealing with, but that it is *our* past, *our* heritage, a heritage which we hold in communal patrimony for *our* children - and therefore it is *our* business to look after it.

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² For further information regarding this degree, contact the Faculty Executive Officer, Faculty of Health, Charles Sturt University, PO Box 588, Wagga Wagga, NSW 2670, Australia.

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