APPENDIX C

UNIVERSITY OF NORTH CAROLINA

REQUEST FOR AUTHORIZATION TO ESTABLISH A NEW DEGREE PROGRAM

INSTRUCTIONS: Please submit five copies of the proposal General Administration. Each proposal should include a 2-3 page executive summary. The signature of the Chancellor is required. Proposals will be submitted electronically after January 1, 2010.

Date: ______July 10, 2010,___________________

Constituent Institution: _________North Carolina State University

CIP Discipline Specialty Title: Environmental Science ______

CIP Discipline Specialty Number: __3.0103___________  Level: B ___ M _X__ 1st Prof ___ D ___

Exact Title of the Proposed Degree: ___Masters of Climate Change and Society

Exact Degree Abbreviation (e.g. B.S., B.A., M.A., M.S., Ed.D., Ph.D.): M._____

Does the proposed program constitute a substantive change as defined by SACS?  Yes __X___ No ___

a. Is it at a more advanced level than those previously authorized?  Yes _____ No _X____

b. Is the proposed program in a new discipline division?  Yes _X____ No _____

Proposed date to establish degree program (allow at least 3-6 months for proposal review: month __August________ year __2011__________________

Do you plan to offer the proposed program away from campus during the first year of operation?  Yes ______ No __X____

If so, complete the form to be used to request establishment of a distance education program and submit it along with this request.

I. DESCRIPTION OF THE PROGRAM

A. Describe the proposed degree program (i.e., its nature, scope, and intended audience).

The Climate Change and Society (CCS) degree program will be a professional science master’s program consisting of one academic year of courses plus a summer internship/research project. The objective of the program is to provide students with sufficient backgrounds in climate science and the implications of global climate change to equip them to make informed decisions in planning and policy. This will be
accomplished by providing instruction in climate science, economics, policy and communications capped by a research project or internship utilizing actual climate data and end-user information.

The one academic year (31 credit hours) professional science master’s degree consists of 9 courses. It is designed for both part time & full time students. The full time curriculum will be offered in the Fall & Spring semesters, with a research project or an internship capstone with industry, government or a non-profit organization at the end of the degree during the summer semester. The part time curriculum will be spread over 2 years. The courses will address the following topics: Fundamentals of Climate Change, Decision Making and Statistics, Geographic Information Systems, Environmental Economics, Climate Risk Analysis, Environmental Policy, Environmental Communication and Research and Environmental Ethics. In addition there will be a 6 credit summer internship/research project.

The degree program is intended for students interested in careers in planning or policy and professionals working in government agencies or private sector firms concerned with any aspect of planning or setting policies affected by global climate change. According to the National Science Foundation “The impacts of climate variability and change on Earth and its life systems, and the responses taken by individuals and societies to them, pose one of the most pressing challenges of our time (National Science Foundation, Program Solicitation NSF 10-542 Climate Change Education Partnership (CCEP) Program, Phase I, 2010).

As the NSF statement indicates, climate risk management is an issue that all organizations, both public and private, will have to address in their planning and operations. Global Climate Change has implications for governments from federal to state to local, and for private sector entities working in insurance, agriculture, tourism, development and many other industries. Graduates of the proposed Master’s of Climate Change and Society (CCS) program will have the climate expertise to work across many sectors and to contribute to the economic development in North Carolina. The CCS degree is an interdisciplinary graduate program that will bridge the gap between the generators of information on climate science, impacts, and control strategies and the users of that information at local, state, and national levels. Currently, no similar program is available in the southeast. The Master’s degree will train students to integrate climate predictions and projections and climate impacts/risk assessment information using decision modeling & state-of-the-art technology in the delivery of information (e.g., GIS & Google Earth).

B. List the educational objectives of the program.

The objective of the program is to equip graduates with a sufficient understanding of climate science, the implications of global climate change and the tools to incorporate
consideration of climate change in policy and planning decisions. The individual skills required will be presented in the courses included in the program and the summer research/teaching course will require demonstration that the skills can be applied.

C. Describe the relationship of the program to other programs currently offered at the proposing institution, including the common use of: (1) courses, (2) faculty, (3) facilities, and (4) other resources.

The majority of courses proposed for the degree program are already offered, as indicated in the table showing the degree plan. The program thus uses courses, faculty and facilities currently available as much as possible. The courses and faculty are from several different colleges.

D. Describe any explorations of collaborative offering of this program and the results of those explorations.

The program has been developed jointly with faculty from UNC-A. The vision is to eventually develop a multi-institutional program, but this application is solely for an NC State degree program. Discussions on development of a system-wide program are continuing as are discussions with UNC-A on mechanics of how their students can avail themselves of our program.

II. JUSTIFICATION FOR THE PROGRAM-NARRATIVE STATEMENT

B. Describe the proposed program as it relates to:

1. the institutional mission and strategic plan and response to UNC Tomorrow

The proposed program is well aligned with North Carolina State University’s mission, building on it’s historic strengths in agriculture, science and engineering with a commitment to excellence in a comprehensive range of academic disciplines to provide leadership for intellectual, cultural, social, economic, and technological development within the state, the nation, and the world. The proposed program is also aligned with North Carolina State University’s strategic plan which includes the following statements, “NC State will continue pursuing its most successful core strategies as an engaged research university.”, and, “Integrate multiple disciplines. It has become clear that 21st century problems are complex. They need multifaceted solutions. If the social, economic, ethical, design, communicative, and environmental dimensions of a problem are not adequately addressed, then scientifically wrought solutions may fail.” The establishment of a Professional Science Master’s Degree in Climate Change and Society would serve to integrate the disciplines of atmospheric science (climate change), communications, economics, statistics, geographic information systems, engineering, and public health.

NC State has identified Energy and the Environment and Health and Well Being as two of its core foci; these are also specific areas recommended by the UNC Tomorrow report (recommendations 4.5 and 4.6). Climate change relates
The proposed degree thus is aligned with NC State’s primary goals. The university has also identified increasing its professional science master’s programs as a goal, this program is aligned with that goal as well.

The UNC Tomorrow Major Finding 4.6 “UNC should assume a leadership role in addressing the state’s energy and environmental challenges.” The proposed degree explicitly follows that recommendation. In addition the proposed masters program also aligns with UNC Tomorrow in the following categories:

4.1.1, Prepare students for successful professional and personal lives in the 21st century and adaptation to the ever-changing world;

4.2.1, Increase access to higher education for traditional students, non-traditional students, and lifelong learners;

4.4.1, Enhance capacity and commitment to respond to and lead economic transformation and community development;

4.6.2, Leverage existing research expertise to address critical environmental issues;

4.6.3, Increase community awareness of environmental and sustainability issues;

4.7.3, Create a mechanism for applying research and scholarship to addressing significant regional and statewide issues;

5.7, Encourage and facilitate interdisciplinary and inter-institutional collaborations among its institutions.

2. student demand

Two methods have been used to assess demand for the program. The first one is a formal survey for students’ demand which was conducted by a NCSU graduate student (Robert Mera) who was hired, July-August, 2008, to conduct the investigation across North Carolina. The survey was targeted at both potential full-time and part-time students interested in the program. The second method was based on head count of potential students at the 2010 American Meteorological Society (AMS) annual conference who visited the NCSU promotional poster which was devoted to the proposed PSM CCS program. The count of students also includes demand expressed via email and telephone contacts. The data indicates that student demand significantly exceeds the target enrollment of 15 students per year in year-1 (part-time & full-time) growing to 35 students of enrollment in year-4. The survey data are included in the attachments and are available online at: http://climlab.meas.ncsu.edu/psmclimate/CCSfinalLB_RobertSurvey.ppt
In addition, student interest in climate change is evidenced by two courses currently offered in our department, MEA 100 Earth Systems Science, which is organized around discussion of the Kyoto Protocols and MEA 140 Natural Hazards and Global Change, both of which close at maximum enrollment of 100 each year. These courses, designed for non-science majors, discuss climate change and its implications. Our current degree programs require extensive mathematics and physical science courses, thus precluding most non-science majors from taking more advanced courses or entering our current graduate degree programs.

Further, the Securities and Exchange Commission (SEC) has adopted a regulation that requires every publicly traded company to include analysis of the effects of global climate change on their business (http://www.sec.gov/news/press/2010/2010-15.htm). The climate change and society degree program will provide employees with evidence of their competence to address climate change implications.

3. societal need (For graduate, first professional, and baccalaureate professional programs, cite manpower needs in North Carolina and elsewhere.)

Climate change has been recognized as a critical factor in planning. Climate change will bring changes in sea level that will dramatically affect coastal areas, changes in precipitation that will affect agriculture and water resources for our cities, changes in ecology that will affect fisheries and wildlife and changes in energy requirements that will affect the entire population and the industrial sector. Each of these areas, agriculture, sea level rise, water resources and coastal ecology are critical for North Carolina, hence there is a need for planners trained in the implications of climate change in these areas.

According to the National Science Foundation “The impacts of climate variability and change on Earth and its life systems, and the responses taken by individuals and societies to them, pose one of the most pressing challenges of our time (National Science Foundation, Program Solicitation NSF 10-542 Climate Change Education Partnership (CCEP) Program, Phase I, 2010).

While the reality of climate change is gradually becoming accepted, the implications of it for future planning are virtually unknown. No current educational programs prepare people adequately for evaluating the effect of climate change. Hence there is a need at federal, state and local levels to have those involved in policy to received adequate training to make informed decisions. Seldom do such people have science backgrounds as they are not typically required for policy jobs. On the other side, few scientists receive training in economics, policy and communications that enable them to assist in the planning process.
This degree program is specifically designed to bridge the gap between climate scientists and policy makers and to create a level of scientific understanding in policy makers not provided by liberal arts degrees, but necessary for informed decision making.

4. impact on existing undergraduate and/or graduate academic programs of your institution. (e.g., Will the proposed program strengthen other programs? Will it stretch existing resources? How many of your programs at this level currently fail to meet Board of Governors’ productivity criteria? Is there a danger of proliferation of low-productivity degree programs at the institution?)

The existing master’s degree programs in the physical sciences and engineering at NCSU are highly technical and are designed for scientists, not policy makers. The existing master’s program in MEAS is a research intensive, thesis based degree. There will be no competition for students with existing programs as the design and objectives of this program are unique. As a professional science master’s program, this program will be self sustaining, generating the income required to provide it. In fact, by using a majority of existing courses, it should provide a net income to the university.

The new program will enhance existing graduate programs that share courses because students of differing backgrounds will now be in the courses, bringing different viewpoints to the climate issues discussed.

B. Discuss potential program duplication and program competitiveness.

1. Identify similar programs offered elsewhere in North Carolina. Indicate the location and distance from the proposing institution. Include a) public and b) private institutions of higher education.

None. There are no similar competing programs in the southeast. The CCS program is multidisciplinary & will train students to acquire skills in climate change science, analysis of climate data, understand the link with public policy & decision making, and effective communication of climate information to the stakeholders. There are no other programs in North Carolina by other institutions that are similar to the proposed PSM graduate degree program. Existing programs focus on only one or two of the skills required.

There are no degree programs with similar titles or emphases in North Carolina, there is one with a similar CIP code: The Master of Arts in Environmental Studies, offered by UNC-W, is an interdisciplinary, graduate degree designed for professionals, practitioners, citizens and students who wish to strengthen their knowledge of the environment. The program, as evidenced by its core courses,
listed in the table below is not related to climate and has a different focus than our proposed program:

Table 1. Courses Required for the MA in Environmental Studies at UNC-W

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 501</td>
<td>Introduction to Environmental Problems &amp; Policy</td>
<td>(3)</td>
</tr>
<tr>
<td>EVS 515</td>
<td>Field Methods in Environmental Studies</td>
<td>(3)</td>
</tr>
<tr>
<td>EVS 518</td>
<td>Research Methods in Environmental Studies</td>
<td>(3)</td>
</tr>
<tr>
<td>STT 501</td>
<td>Applied Statistical Methods</td>
<td>(3)</td>
</tr>
</tbody>
</table>

In view of the established expertise of NC State faculty in climate research, statistics and resource economics, the program will be competitive nationally. Our close affiliation with the National Center for Climatologic Data (NCDC) in Asheville, including the Cooperative Institute for Climate and Satellites-NC, which is directed by Otis Brown a professor in MEAS and located within the NCDC building, provides a unique ability to work with real-time and archived climate data and world-class climate scientists.

2. Indicate how the proposed new degree program differs from other programs like it in the University. If the program duplicates other UNC programs, explain a) why is it necessary or justified and b) why demand (if limited) might not be met through a collaborative arrangement (perhaps using distance education) with another UNC institution. If the program is a first professional or doctoral degree, compare it with other similar programs in public and private universities in North Carolina, in the region, and in the nation.

One Master’s programs with a similar CIP codes exists, but is not similar to our proposed program. The Master of Environmental Assessment Degree, a joint CALS/CNR degree, “is an interdisciplinary program focused on understanding the adverse impacts that pollutants and naturally occurring substances pose on human health and the environment”. Its curriculum contains no climate science courses and includes only one course, intro to GIS, that is also in our proposed program.

The science of climate change involves atmospheric science, including meteorology and air quality, marine science, including physical, chemical and biological oceanography and geochemistry. MEAS has the only PhD program in meteorology in the state as well as PhD programs in marine science and earth science. Related fields including statistics and biology/ecology are also strengths
of the institution with PhDs in each area. No other institution in NC has this combination of expertise.

The program is unique at the university by combining the physical science basis of climate change, taught by climate researchers, with economics, policy, communication and ethics, thus differentiating it from other science degrees by its policy emphasis and from policy/planning degree programs by its science content. As the recent decade long debate about the reality of climate change, and the implications of it, has demonstrated, few non scientists have the background to understand current climate predictions. However most policy is made by non scientists for science majors seldom have the background in economics, political science and communications to effectively utilize their knowledge in planning.

The only comparable degree program is offered by Columbia University in New York. They offer a climate and society master’s degree that has received international acclaim. Although their focus is slightly different, concentrating on the effects of climate change on developing countries, it is quite similar to ours. Their program is less proscribed as there are 15 credits of electives.

C. Enrollment (baccalaureate programs should include only upper division majors, juniors and seniors).

Headcount enrollment
Show a five-year history of enrollments and degrees awarded in similar programs offered at other UNC institutions (using the format below for each institution with a similar program); indicate which of these institutions you consulted regarding their experience with student demand and (in the case of professional programs) job placement. Indicate how their experiences influenced your enrollment projections.

There are no similar degrees. Our target audience includes both new students and current professionals who wish to acquire the appropriate science background. The program combines science, resource economics and planning, perhaps looking at their trends would be the best way to approximate demand.

D.

Institution: _____________________________________________________________

Program Title: __________________________________________________________

<table>
<thead>
<tr>
<th></th>
<th>(year)</th>
<th>(year)</th>
<th>(year)</th>
<th>(year)</th>
<th>(year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degrees-awarded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use the format in the chart below to project your enrollment in the proposed program for four years and explain the basis for the projections:

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>10</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Part-time</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>15</strong></td>
<td><strong>20</strong></td>
<td><strong>25</strong></td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>

Please indicate the anticipated steady-state headcount enrollment after four years:
Full-time __20_ Part-time ___15_______ Total __35_____________

**SCH production** (upper division program majors, juniors and seniors *only*, for baccalaureate programs).

Use the format in the chart below to project the SCH production for four years. Explain how SCH projections were derived from enrollment projections (see UNC website for a list of the disciplines comprising each of the four categories).

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td>30</td>
</tr>
<tr>
<td>Category II</td>
<td>.</td>
</tr>
<tr>
<td>Category III</td>
<td>180</td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td>45</td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td>270</td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year 3</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Program Category</strong></td>
<td><strong>UG</strong></td>
</tr>
<tr>
<td>Category I</td>
<td>60</td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

| Year 4 | Student Credit Hours |
|---|---|---|---|
| **Program Category** | **UG** | **Masters** | **Doctoral** |
| Category I | 82 | 275 | |
| Category II | | | |
| Category III | | 495 | |
| Category IV | | | |

Explanation: Enrollment figures shown in the enrollment projection table above were used combined with the courses listed in section II D.

II. PROGRAM REQUIREMENTS AND CURRICULUM
A. Program Planning.
   1. List the names of institutions with similar offerings regarded as high quality programs by the developers of the proposed program.

   Columbia University (New York) offers a master’s of arts in climate and society that is internationally recognized as the highest quality program in this area.

   2. List other institutions visited or consulted in developing this proposal. Also discuss or append any consultants' reports, committee findings, and simulations (cost, enrollment shift, induced course load matrix, etc.) generated in planning the proposed program.

   We consulted with Columbia University in the development of our program and send a delegation to Columbia to discuss our program. A copy of the report of this consultation is attached. We also spoke to representatives from WCU, NCSU, UNC-Chapel Hill, Northern Illinois, Univ. of South Carolina, Univ. of Arizona, and Duke during planning of the degree program. A PowerPoint summary of the planning process, with contacts noted, is available at:

   http://climlab.meas.ncsu.edu/psmclimate/CCSContacts_robertSurvey_Robert.xls
B. Admission. List the following:
1. Admissions requirements for proposed program (indicate minimum requirements and general requirements).
   a. B.A. or B.S. completed with a GPA of 3.0 or better
   b. Application letter describing career plans with explanation of why degree is sought
   c. Three letters of recommendations, if applicant is a current professional working in a policy/planning related field, at least one letter from supervisor or equivalent.
2. Documents to be submitted for admission (listing or sample).
   a. transcript
   b. Letter of Application
   c. Three letters of reference

C. Degree requirements. List the following:
1. Total hours required. Major. Minor.
   Master’s. 31 credit hours
2. Proportion of courses open only to graduate students to be required in program (graduate programs only).
   None, although a number of seats equivalent to those required by accepted students in the program will be reserved.
3. Grades required.
   C- or better is required in all courses. A 3.0 GPA must be maintained.
4. Amount of transfer credit accepted.
   In accord with University regulations, up to 12 hours can be transferred if the student was registered in another master’s program and equivalent courses were taken.
5. Other requirements (e.g. residence, comprehensive exams, thesis, dissertation, clinical or field experience, "second major," etc.).
   A six credit hour research experience or internship is required as part of the 31 credit hours in the professional masters degree program.
6. Language and/or research requirements.
A six credit hour research experience/internship is required.

7. Any time limits for completion.

Part time students may take up to three years to complete the program.

D. List existing courses by title and number and indicate (*) those that are required. Include an explanation of numbering system. List (under a heading marked "new") and describe new courses proposed.

<table>
<thead>
<tr>
<th>Existing Courses</th>
<th>Credits</th>
<th>Numbering</th>
</tr>
</thead>
<tbody>
<tr>
<td>St-511 Experimental Statistics for Biological Sciences *</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>GIS 510 Introduction to Geographic Information System Science *</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>ECG 515 Environmental and Resource Policy *</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>COM 436 Environmental Communication *</td>
<td>3</td>
<td>Advanced Undergraduate Course</td>
</tr>
<tr>
<td>COM 529 Communication Campaigns *</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>PHI 816 Introduction to Research Ethics *</td>
<td>1</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>VPH 554 Agricultural Health and Trade (i)</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>MEA 585 Hydrology (i)</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
<tr>
<td>CE 586-Engineering Hydrology (i)</td>
<td>3</td>
<td>Graduate Course</td>
</tr>
</tbody>
</table>

* course is required for degree
1. Must take one of the three listed electives

New Courses Required for Degree

<table>
<thead>
<tr>
<th>MEA 501 Fundamentals of Climate Change (NEW Graduate Course) 3 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course will present the basic science of climate change, including chemical and physical systems and processes. Climatological data, climate models and predictions/projections will be introduced. Emphasis will be placed on relating predicted changes to manifestations such as sea level rise and precipitation changes (description attached).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEA 502/ST 502 Climate Risk Analysis for Adaptation (NEW Graduate Course) 3 Credits</th>
</tr>
</thead>
</table>
Applying methods of risk analysis to evaluate options for dealing with climate change. The course will introduce appropriate statistical methods and develop applications to climate-change related issues (description attached).

**MEA 503 Research Project in Climate Change (NEW Graduate Course) 6 Credits**

Students will participate in a summer project or internship in collaboration with the National Center for Climatological Data (NCDC) mainly in Asheville, and others with local governments, NGOs & the private sector. The projects, jointly overseen by the course instructor and the scientist involved at the NCDC. Students will prepare a professional presentation and paper based on the research which will be presented at the end of the session. The Cooperative Institute for Climate and Satellites –NC (CICS-NC), a NOAA funded institute located in the NCDC and directed by Otis Brown, a faculty member in MEAS will assist in identifying topics for the projects (description attached).

### III. FACULTY

A. List the names of persons now on the faculty who will be directly involved in the proposed program. Provide complete information on each faculty member’s education, teaching experience, research experience, publications, and experience in directing student research, including the number of theses and dissertations directed for graduate programs. The official roster forms approved by SACS can be submitted rather than actual faculty vita.

- Fredrick Semazzi *(complete details to be provided)*
- Gary Comstock *(complete details to be provided)*
- Maria Correa *(complete details to be provided)*
- Hugh Devine *(complete details to be provided)*
- John Fountain *(complete details to be provided)*
- James Kiwanuka-Tondo *(complete details to be provided)*
- Margery Overton *(complete details to be provided)*
- Peter Bloomfield *(complete details to be provided)*

B. Estimate the need for new faculty for the proposed program over the first four years. If the teaching responsibilities for the proposed program will be absorbed in part or in whole by the present faculty, explain how this will be done without weakening existing programs.

Two new courses and a research experience are to be developed for this program. The remainder of the courses are currently offered and have room for the anticipated increase in student demand. It is anticipated that funds will be needed to buy out the time for the faculty identified in the previous section to teach the two new courses. It is not expected that a new faculty member is needed. A program coordinator and an instructor of record for the summer research experience will also be needed, it is expected that funds will be
required to pay partial summer salary for the summer course and to buy out part of the
time for the program coordinator.

The faculty member who will teach the new climate science course will be Fredrick
Semazzi. Semazzi currently teaches one section of calculus each year. There are
numerous available experienced calculus instructors that can teach Semazzi’s’s section if
buyout money is provided. The second course will be considered part of Fred’s normal
course load in MEAS. This will require hiring an instructor to teach the course Semazzi
normally would have taught in MEAS. There are available doctoral level instructors
available that could be hired, thus the teaching program would not be weakened.

C. If the employment of new faculty requires additional funds, please explain the source of
funding.

The program is a professional science master’s program, funding will be generated from
the PSM funding model.

D. Explain how the program will affect faculty activity, including course load, public service
activity, and scholarly research.

All courses in the program except 3 are currently being taught. The additional students
will not require added sections, thus the effect on faculty activity is limited to the three
new courses. Two of these courses will be taught by Prof. Semazzi, these courses will
substitute for two other courses he is currently teaching, thus his teaching load will not
change. Since his research is in climate change and the application of climate change
information to public policy, his research will not be negatively impacted. The
development of NC State as a leader in the climate and society field, due to this program,
should in fact actually enhance our research potential in this area. The third course will
be a summer course, the supervisor who will be hired will take this duty on as a summer
course and thus his/her normal teaching load will not be impacted. The objective of the
summer course is a research experience. It is expected that this will provide a strong base
for increasing climate and society research thus improving the research activity of all
involved.

IV. LIBRARY
A. Provide a statement as to the adequacy of present library holdings for the proposed program.

NC State already offers degree programs in all the areas covered by this program. Since
this is a non-thesis master’s degree a research-level collection is not required. The library
thus already has an adequate collection. No additional resources are required.

Climate data, a critical need for this degree, is available, without cost from the National
Center for Climatological Data.

B. State how the library will be improved to meet new program requirements for the next five years. The
explanation should discuss the need for books, periodicals, reference material, primary source
material, etc. What additional library support must be added to areas supporting the proposed
program?

As indicated in the response to the previous section, since this is a non-thesis program
based entirely on course work, no additions to the library are required.
C. Discuss the use of other institutional libraries.

Duke has a larger public policy concentration than NC State, any material needed that is not in the NC State library is in the Duke collection. Since the summer projects are intended to be research projects it is possible students may avail themselves of material from the Duke collection. UNC-CH has a more extensive collection on health effects of climate change. It is likely that student projects will utilize this material.

V. FACILITIES AND EQUIPMENT
A. Describe facilities available for the proposed program.

The program is a non-thesis based masters that requires only classrooms on campus. All courses but two are already being taught and thus additional classrooms space will be needed only for the two new courses. There are adequate facilities available in Jordan Hall to teach these classes. The summer course will be based mainly in Asheville NC. This will be a research experience with students working as interns or researchers in the Asheville area. Since the course is in the summer, necessary classroom space (for associated seminars) is available at UNC-A. UNC-A has been involved with development of this degree program from the start.

B. Describe the effect of this new program on existing facilities and indicate whether they will be adequate, both at the commencement of the program and during the next decade.

As discussed in the previous section, current facilities are adequate for the program.

C. Discuss any information technology services needed and/or available.

MEAS maintains three large computer laboratories for instruction. They have sufficient capacity and support (2 full time IT personnel) to support the new program. MEAS also has a fully equipped distance education room to support planned distance education offerings and provide regular coordination with the Asheville summer program.

D. Discuss sources of financial support for any new facilities and equipment.

No new equipment or facilities are being requested.

VI. ADMINISTRATION
Describe how the proposed program will be administered, giving the responsibilities of each department, division, school, or college. Explain any inter-departmental or inter-unit administrative plans. Include an organizational chart showing the "location" of the proposed new program.

The program will be administered by the department of marine earth and atmospheric sciences of the college of physical and mathematical sciences. The department currently administers master’s and doctoral programs with approximately 100 graduate students, the existing staff including the director of graduate programs, director of advising and student support service coordinator will administer the program. The department’s graduate program has been as large as 120 students in the past so they have shown the capacity to handle the increased load.
There will be a curriculum committee, comprised of all the instructors involved in the program that will meet regularly to review the program. The three new courses are all MEAS courses and will thus be developed and evaluated in the same manner all department courses are.

VII. ACCREDITATION
Indicate the names of all accrediting agencies normally concerned with programs similar to the one proposed. Describe plans to request professional accreditation. If the proposed new degree program is at a more advanced level than those previously authorized or if it is in a new discipline division, was SACS notified of a potential "substantive change" during the planning process? If so, describe the response from SACS and the steps that have been taken to date with reference to the applicable procedure.

There are no formal accreditations in atmospheric sciences, (including climate science). The department already offers a doctoral degree so the degree is not at a more advanced level. There has been no discussion with SACS. There is no CIPS code for climate science, although the most appropriate code is different from the codes for existing MEAS degrees, the subject matter (climate science) is part of our disciplines and we have been engaged in climate research for decades.

VIII. SUPPORTING FIELDS
Are other subject-matter fields at the proposing institution necessary or valuable in support of the proposed program? Is there needed improvement or expansion of these fields? To what extent will such improvement or expansion be necessary for the proposed program?

Statistics, Economics, Communications, Geographic Information Systems, Ethics and Political Science are essential elements in the program. Each area has appropriate expertise in place and each department involved is teaching the courses required for the program. The only new courses to be developed will be within MEAS.

IX. ADDITIONAL INFORMATION
Include any additional information deemed pertinent to the review of this new degree program proposal.

X. BUDGET
Provide estimates (using the attached form) of the additional costs required to implement the program and identify the proposed sources of the additional required funds. Use SCH projections (section II.C.) to estimate new state appropriations through enrollment increase funds. Prepare a budget schedule for each of the first four years of the program, indicating the account number and name for all additional amounts required. Identify EPA and SPA positions immediately below the account listing. New SPA positions should be listed at the first step in the salary range using the SPA classification rates currently in effect. Identify any larger or specialized equipment and any unusual supplies requirements.

For the purposes of the second and third year estimates, project faculty and SPA position rates and fringe benefits rates at first year levels. Include the continuation of previous year(s) costs in second and third year estimates.

Additional state-appropriated funds for new programs may be limited and in recent years have been almost non-existent. Except in exceptional circumstances, institutions should request such funds for no more than three years (e.g., for start-up equipment, new faculty positions, etc.), at
which time enrollment increase funds should be adequate to support the new program. Therefore
it will be assumed that requests (in the "New Allocations" column of the following worksheet) are
for one, two, or three years unless the institution indicates a continuing need and attaches a
compelling justification. However, funds for new programs are more likely to be allocated for
limited periods of time if available at all.

The new costs for this program include

a. Course development costs for the two new courses

b. Instructor costs for the two new courses

c. Administration costs for the program administrator

The program is designed as a professional master’s program; the tuition from the students in the program
is projected to sustain the program. All courses will eventually offered as DE courses through Delta,
providing an additional revenue source.

[Form continues on next page.]
**SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM**

**INSTITUTION** ___________________________________________  **DATE** _______________________

**Program (CIP, Name, Level)**

___________________________________________________________

**Degree(s) to be Granted** _________________  **Program Year** _______________________

### ADDITIONAL FUNDS REQUIRED - BY SOURCE

<table>
<thead>
<tr>
<th><strong>101 Regular Term Instruction</strong></th>
<th>Reallocation of Present Institutional Resources</th>
<th>Enrollment Increase Funds</th>
<th>Federal Other (Identify)</th>
<th>New Allocations</th>
<th>Total</th>
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<td>1210 SPA Regular Salaries</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<tr>
<td>(Identify positions)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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<tr>
<td>1310 EPA Academic Salaries</td>
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<tr>
<td>(Identify)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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<tr>
<td>1810 Social Security</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<tr>
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<tr>
<td>1830 Medical Insurance</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<tr>
<td>2000 Supplies and Materials</td>
<td>$_________  $_________  $_________  $1000  $_________</td>
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<td>(Identify)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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<tr>
<td>3000 Current Services</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<tr>
<td>(Identify)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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<tr>
<td>4000 Fixed Charges</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<tr>
<td>(Identify)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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<tr>
<td>5000 Capital Outlay</td>
<td>$_________  $_________  $_________  $_________  $_________</td>
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<td>(Equipment)(Identify)</td>
<td>(<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (<em><strong><strong><strong><strong>)  (</strong></strong></strong></strong></em>)  (_________)</td>
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</tbody>
</table>
XI. EVALUATION PLANS

All new degree program proposals must include an evaluation plan which includes: (a) the criteria to be used to evaluate the quality and effectiveness of the program, (b) measures to be used to evaluate the program, (c) expected levels of productivity of the proposed program for the first four years of operation (number of graduates), (d) the names, addresses, e-mail addresses, and telephone numbers of at least three persons (six reviewers are needed for graduate programs) qualified to review this proposal and to evaluate the program once operational, and (e) the plan and schedule to evaluate the proposed new degree program prior to the completion of its fifth year of operation once fully established.

PROGRAM EVALUATION PLAN

I OBJECTIVES AND OUTCOMES

OBJECTIVES

1. To prepare students to be able to incorporate global climate change implications in developing policy, assessing risk or developing plans in corporate, government or NGOs.

2. To provide a successful graduate program with national and international visibility that provides expertise to local, state, federal and international institutions.

Outcomes for Objective 1.

a. Students should be able to articulate basic climate science principles, relevant climate change data and the implications of climate change in their career areas.

b. Students should be able to develop scientifically based documents on potential climate change impacts, risks and mitigation strategies.
Outcomes for Objective 2

- The program should influence policy through the participation of graduates in local, state and federal government agencies, private sector corporations and NGOs.
- The program should attract, recruit, retain, and position high quality students for employment in academia, government, and industry who address global climate change in policy and planning.
- The program should graduate full time students in a timely manner.

II DATA SOURCES

Item A: Tracking of Students

1. Database of students enrolled, their backgrounds and career objectives
2. Record of student progress, time to degree and GPA
3. Portfolio from final projects

Item B: Final Project

1. Evaluate background knowledge in climate science
2. Evaluate assessment of climate-change related problem
3. Evaluate synthesis of data and conclusions
4. Evaluate written ability to transmit knowledge
5. Evaluate Oral Presentation as scientific talk

Item C Tracking Graduates

1. Database of initial and current employment by graduates
2. Surveys of graduates at 1, 3 and 5 years after graduation for recommendations on degree content.

III LINKED OUTCOMES and DATA SOURCES

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Data Source</th>
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</thead>
<tbody>
<tr>
<td>1a</td>
<td>Item A2, A3, B1, B2, B3, B4, B5</td>
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<tr>
<td>1b</td>
<td>Item A3, B3, B4, B5</td>
</tr>
<tr>
<td>2a</td>
<td>Item A1, C1</td>
</tr>
<tr>
<td>2b</td>
<td>Item A1, A2, C1</td>
</tr>
<tr>
<td>2c</td>
<td>Item A2</td>
</tr>
</tbody>
</table>

IV SCHEDULE OF DATA COLLECTION AND ANALYSIS

Item A: August 1st of each year starting after first summer projects are completed.
Item B: August 1st of each year starting after first summer projects are completed.
Item C: August 1st of each year starting after first summer projects are completed.

Analysis of enrollment will take place every fall to help determine advertising strategy for the next year. Analysis of data from surveys will take place each fall to provide input to curriculum committee.

A. Projected productivity levels (number of graduates):

<table>
<thead>
<tr>
<th>Level</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>M</td>
<td>8</td>
<td>12</td>
<td>23</td>
<td>25</td>
<td>68</td>
</tr>
<tr>
<td>I/P</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>D</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

(Key: B-Bachelor's, M-Master's, I/P-Intermediate or Professional, D-Doctoral)

B. Recommended consultant/reviewers: Names, titles, addresses, e-mail addresses, and telephone numbers. May not be employees of the University of North Carolina.

<table>
<thead>
<tr>
<th>Proposed Board Member</th>
<th>Address</th>
<th>Phone +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liqiang Sun</td>
<td>International Research Institute (IRI) for Climate &amp; Society 231 Monell Building 61 Route 9W Palisades, New York 10964</td>
<td>Phone: 845 680 4433 <a href="mailto:sun@iri.columbia.edu">sun@iri.columbia.edu</a></td>
</tr>
<tr>
<td>Sharon Leduc</td>
<td>NOAA’s National Climatic Data Center Veach-Baley Federal Building 151 Patton Avenue Asheville, NC 28801-5001</td>
<td>828 271-4848 <a href="mailto:Sharon.LeDuc@noaa.gov">Sharon.LeDuc@noaa.gov</a></td>
</tr>
<tr>
<td>Jeffrey K. Lazo</td>
<td>National Center for Atmospheric Research (NCAR) Research Applications Laboratory and Institute for the Study of Society and Environment</td>
<td>303-497-2857 <a href="mailto:lazo@ucar.edu">lazo@ucar.edu</a></td>
</tr>
</tbody>
</table>
C. Plan for evaluation prior to fifth operational year.

XII. The Curriculum committee will meet every fall to discuss the prior year's program. It is expected that adjustments to course content and presentation will be made each year for the first few years to reflect performance of students, student evaluations and faculty evaluation.

XIII. **REPORTING REQUIREMENTS**
Institutions will be expected to report on program productivity after one year and three years of operation. This information will be solicited as a part of the biennial long-range planning revision.

Proposed date of initiation of proposed degree program:

August 2011

This proposal to establish a new degree program has been reviewed and approved by the appropriate campus committees and authorities.

**Chancellor:**