

# **COLUMBIA UNIVERSITY'S MPA IN ENVIRONMENTAL SCIENCE AND POLICY: REFLECTIONS ON ITS FIRST SEVEN YEARS**

By Steven Cohen and Robin DeJong  
Columbia University's School of International and  
Public Affairs and Earth Institute

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The purpose of this paper is to provide an indication of the overall success of Columbia University's MPA in Environmental Science and Policy. This is a cohort-based and intensive three semester 54 point program of a little more than eleven months in duration. This paper briefly summarizes the history of Columbia's MPA in Environmental Science and Policy, discusses its record of attracting students, its curriculum, the success of its graduates and their assessment of the program's strengths and weaknesses.

### **1.0 Background**

In June 2002, Columbia's School of International and Public Affairs (SIPA) and Earth Institute launched the Graduate Program in Earth Systems Science, Policy and Management at the Biosphere 2 Center in Oracle, Arizona. The program joined a set of one-semester and summer undergraduate programs in environmental science and astronomy offered there. Four full time faculty and a number of part time and adjunct faculty were hired to teach the class, which began with 43 students in June 2002 and graduated 39 in May 2003.

By November 2002, Columbia had a new president, the Earth Institute had a new director, and the University, like the city and the nation, operated in a tougher economic environment than the one enjoyed during the 1990's. The new Earth Institute Director, Jeffrey Sachs, was committed to developing a comprehensive set of educational offerings in environmental policy, science and sustainable development. He and the Dean of SIPA decided that the strategy of

building educational offerings in this field at Columbia would be better served by moving the program to Columbia University's Morningside campus in New York City and its Lamont-Doherty Earth Observatory in Palisades, New York. In late November 2002, SIPA announced the program would move to New York. In June 2003, 48 students attended the program's orientation session in New York City and at Columbia's Lamont-Doherty Earth Observatory just north of the city.

Today, six years later, the program has graduated 306 students and they are working all over the world as environmental professionals. This paper will describe this unique program and present data from a survey of alums on their satisfaction with the program.

For most MPA students, including those at Columbia, a typical curriculum includes:

- A core of functional skill-building courses in public management, financial management, quantitative analysis, and applied microeconomics. These provide the degree's professional analytic core.
- A set of contextual courses on public administration including courses on the political, social, ethical and economic environment of public policy and management.
- A concentration in a field of public policy such as social welfare policy, urban policy, health policy, national security, or environmental policy.

- A capstone experience—typically a client-based workshop or a thesis.

Most of the core and contextual courses rely on cases and examples from a variety of areas of public policy. Examples are used to explain concepts and to provide insight by comparing one issue area to another. In this program, every example, case study, research paper and workshop project pertains to the environment. When we teach public finance, we use the example of financing a sewage treatment plant, rather than financing a school construction. The analytic tools students develop through the program orient and enable them to tackle environmentally-specific issues.

As they obtain knowledge about typical MPA analytic methods and context, students obtain a tremendous depth of understanding about this single area of interest. This depth of knowledge is not cost-free. It is “purchased” at the expense of a breadth of knowledge of other issue areas. It sacrifices the advantages of comparison between issue areas. However, it provides students with intense exposure to the field of environmental policy. In addition, since environmental issues are very difficult to understand without a rudimentary knowledge of earth systems science, we require an intense sequence in environmental science as part of the program’s concentration. This is accomplished through a “summer of science” curriculum that consists of five courses in environmental science.

## 2.0 The Curriculum of the MPA in Environmental Science and Policy

The curriculum is divided into a core, a concentration and an integrating workshop.

### 2.1 The Core

The core curriculum, summarized in Exhibit 1, provides skills to analyze

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#### **Exhibit 1: The MPA in Environmental Science and Policy Curriculum at a Glance (Total: 54 points)**

##### **Summer Term**

- Environmental Chemistry (2 points)
- Toxicology (2 points)
- Climatology (2 points)
- Hydrology (2 points)
- Ecology (4 points)
- Workshop in Applied Earth Systems Management\*
- Earth Systems and Environmental Politics, Policy and Management

18 points

##### **Autumn Term**

- Public Management
- Microeconomics and Policy Analysis
- Quantitative Techniques and Systems Analysis in Policymaking and Management
- Political Context of Public and Private Management (Recommended but not required—provides space for an elective)
- Environmental Ethics, Values and Justice
- Workshop in Applied Earth Systems Management

18 Points

##### **Spring Term**

- Financial Management
- Microeconomics and Policy Analysis II
- Quantitative Techniques and Systems Analysis in Policymaking and Management II
- The Economics of Sustainable Development (Recommended but not required—provides space for an elective)
- Workshop in Applied Earth Systems Policy Analysis (6 points)

18 Points

*\*Each course is worth 3 points unless noted otherwise*

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and understand the formulation and management of public policy. As the non-environmental or general MPA Program evolved at Columbia, its core has increasingly included specific professional and vocational skills such as memo-writing, oral briefings, group process and team building, spreadsheet and other forms of financial analysis, use of computer programs and the World Wide Web. The “environmental” MPA benefits from this evolution and teaches these hands-on skills as well. ***The principle goal of the core is to provide students with the analytic, communication and work skills required to be problem-solving, earth system professionals.***

The core curriculum focuses its case studies, examples, and policy and management exercises on earth systems issues. Students obtain the same functional skills as any Master of Public Policy and Administration student, but, in addition, learn to apply the craft of policy and management analysis to earth systems problems and programs. The core includes courses in public management, financial management, politics and policy, quantitative analysis, policy analysis and microeconomics.

## *2.2 The Workshop*

In the Workshop, master’s students integrate their understanding of natural science, social science, policy studies and management in a problem-solving exercise. The chief advantage of this experience is the practical training gained by working on real problems where student analyses and reports may

have an impact on actual public sector operations. The basic objective of the Workshops in Applied Earth Systems Management and Applied Earth Systems Policy Analysis is to teach students how to integrate knowledge and organize an effort to solve an earth systems public policy problem. It provides an opportunity to move beyond multi-disciplinary learning to integrative interdisciplinary problem solving.

### *2.2.1 Summer and Fall Semester: The Workshop in Applied Earth Systems Management*

In the summer and fall semesters, the Workshop emphasizes the science behind the problem and management issues. Students enroll in small, faculty-advised project teams and design a detailed operational plan for addressing an important public policy problem. Each workshop faculty member selects a piece of proposed, but not yet enacted, state, federal or local environmental law (or a U.N. Resolution) and students then develop a plan for implementing and managing the new law. In the summer semester the workshop focuses on the science of the management problem and groups are required to write reports explaining the environmental science aspects of the management problem to political decision makers who are not scientists. In the fall semester the workshop completes the operational plan for implementing the program. The emphasis in the summer workshop is to develop tools for managing the work of scientists and explaining science to policy makers.

### *2.2.2 Spring Semester: The Workshop in Applied Earth Systems Policy Analysis*

In the spring semester, new groups are formed and analytic projects are undertaken for real-world clients in government and nonprofit agencies. These teams, working under the supervision of faculty members, write a report analyzing an actual environmental policy or managerial problem faced by a government or nonprofit organization.

### *2.3 The Concentration*

Human impacts on the planet have reached truly global proportions. We have increased the amount of carbon dioxide in our atmosphere by about one-third since the start of the industrial revolution. This greenhouse gas is probably the cause of the warmest global temperatures on record, certainly for the century, and if paleoclimate records are right, for the millennium. We have nearly doubled the amount of nitrogen available to plants and microbes, fertilizing the globe. We are in the midst of the most rapid extinction of species the Earth has ever experienced. Humans directly or indirectly use about 40% of the terrestrial plant production and at least half of the world's river flow, limiting the availability of these resources to other species. We have punched holes in the Earth's protective ozone layer and emit more toxic metals to the environment each year than all natural processes combined. We have also made new chemicals with adverse health effects that persist in the environment and have spread around the globe.

When we put this all together, we must conclude that humans are “managing” some significant parts of the Earth system, and for the most part have been doing this unintentionally. We did not set out to warm the planet or drive creatures to extinction; these are unintended consequences of our other activities. Until recently, we did not even know that many of these consequences existed.

So now we know, or at least some of us know, the effects of our actions. What do we do about it? Unfortunately, there are no easy answers. Certainly, our current management through ignorance is not going to serve us well in the long run. However, any plan to change the rates at which humans alter parts of the Earth system has its own share of unintended consequences. It is the premise of the Earth System Concentration that it is better to know what these are and to face them squarely than to proceed in the dark. If this is the case, we have a lot of learning to do.

In the Earth System Concentration we learn the fundamental science of Earth Systems and Conservation Biology, as well as examine how science is used, not used or misused in human management of ecosystems. Students in the program learn the fundamentals of Earth systems and ecosystems, including their human dimensions. Students with an undergraduate background in natural and physical sciences come to better understand the social implications and

consequences of environmental science research. Students with an undergraduate background in Social Sciences and Humanities will develop a better understanding of the processes involved in collecting and analyzing natural science data.

Students develop a multi-faceted understanding of the human role in environmental change and are able to compare human-induced change to natural variability. They are able to critically evaluate efforts to manage the human role in environmental change and can apply their knowledge to a variety of spatial and temporal scales.

The concentration provides a solid foundation in environmental policy and social sciences with courses that build on the core curriculum by analyzing the economic, political, ethical, and management issues raised in the study of earth systems policy problems.

The Earth Systems Concentration is comprised of both natural and social science courses. The natural science courses are:

- Environmental Chemistry (2 points)
- Toxicology (2 points)
- Climatology (2 points)
- Hydrology (2 points)
- Ecology (4 points)

The three social science courses are:

- Earth Systems, Environmental Politics, Policy and Management
- The Economics of Sustainable Development
- Ethics, Values and Justice

The science component of the concentration is designed to enable students to understand enough science to manage the work of scientific experts. The goal is for our students to be capable of more than passive consumption or understanding of environmental science. However, we do not expect MPAs to become producers of scientific research. The goal is that students will develop enough understanding and confidence with environmental science to manage experts and to know what you don't know. The focus of the environmental science taught in the program is to develop an understanding of ecological processes that *directly* affect human health and well being. The policy and management issues our graduates are trained to address include global change issues such as global warming but more frequently focus on:

- The provision of safe drinking water;
- Environmentally-sound sewage treatment and disposal;
- Solid and toxic waste management; and
- The control of local sources of air pollution.

The science required in this concentration is designed to support global and local environmental decision making and management.

### **3.0 Attracting Students**

Each year, both the School of International and Public Affairs and the Earth Institute undertake an extensive effort to recruit an outstanding class for the program. Advertisements are placed in college newspapers, information packets and updates about the program are sent to university faculty across the country, and posters describing the program are sent out for display in a variety of schools throughout the U.S. and overseas. Schools are selected based on their ranking in subjects that we want to recruit students from, including environmental studies, economics, public management and others. Print ads also run in the *New York Times* and other select publications such the *New York Observer* and magazines which may be running special education or environmental issues.

Additionally, the program markets directly via e-mail to students who have scored high in standardized tests and have majored in subjects we want to draw from. This includes GRE and GMAT test-takers who fit the desired profile of MPA in Environmental Science and Policy students. There is also an online component to the program's marketing. The program purchases search engine key words to drive traffic to our website. We also promote the program through social networking sites and list it on websites that are commonly used by

prospective graduate students when researching schools and programs, such as Petersons.com.

Finally, a set of information sessions are held on Columbia's campus and about 20 schools are visited by the program's recruiters. Prospective students are encouraged to visit Columbia, sit in on classes and meet with current students. In total, approximately \$120,000 plus labor is spent on marketing each year.

The admissions process is selective and the program is attractive to applicants in that approximately half of those that are admitted each year enroll. The selection of applicants is based on a 10-point scale that includes the following criteria: undergraduate grade point average (3 points); math and science preparation (1 point); standardized test scores (GRE, GMAT, LSAT) (1 point); demonstrated commitment to public service (2 points); familiarity with environmental issues (1 point); clarity of goals and experience (1 point); and, quality of letters of reference (1 point).

As Exhibit 2 indicates the program has gradually increased its applicant pool from 93 applications the first year to 222 applications this past year. Its one-year format and summer of science curriculum both attract and repel applicants. While additional applications are always sought, limits on physical space and

faculty size prevent additional growth in enrollment. If the applicant pool increased dramatically, this might be revisited, but additional growth is unlikely.

**Exhibit 2: Application and Enrollment Data**

| <b>Year</b>   | <b>Applications</b> | <b>Enrollments</b> | <b>Graduates</b>          |
|---------------|---------------------|--------------------|---------------------------|
| 2002-2003     | 93                  | 43                 | 39                        |
| 2003-2004     | 122                 | 48                 | 44                        |
| 2004-2005     | 147                 | 59                 | 54                        |
| 2005-2006     | 206                 | 61                 | 57                        |
| 2006-2007     | 190                 | 53                 | 53                        |
| 2007-2008     | 213                 | 59                 | 59                        |
| 2008-2009     | 222                 | 59                 | Not yet known             |
| <b>TOTALS</b> | <b>1,193</b>        | <b>382</b>         | <b>306 (possible 365)</b> |

**4.0 The Impact of the Program: Results of a Survey of the Program’s**

**Alums**

The following details the findings of a recent survey of all alumni of the MPA in Environmental Science and Policy program who graduated between 2003 and 2008. The survey consists of ten questions and was sent electronically on July 16, 2008, and made available online through SurveyMonkey.com on July 30, 2008. Three follow-up messages, including the announcement of the online survey, were sent to alumni. Out of 306 who received the survey, we received 139 responses for a response rate of approximately 45%. While this is a high rate of response, we cannot be certain that these results are representative of

the whole group of graduates. It is possible those who responded are more satisfied in their employment or are those who are most successful, leading to a higher degree of citizenship. On the other hand, it could be that our most satisfied and successful graduates are too busy to respond to surveys. We have no way of knowing. However, this is the best information we have. The findings provide a profile of alumni employment at the time of the survey and their evaluation of the MPA in Environmental Science and Policy program.

We find that almost all of the 139 respondents are either employed or continuing their education. Only 12 are currently unemployed but are actively seeking employment. Of the 118 working alumni, 47 are in the public sector, 44 are in the private sector, and 27 work at nonprofits. This shows a large, young workforce fulfilling the mission of the program through public service positions.

When asked about salary, 102 respondents provided answers. Of these 102, the average salary was roughly \$60,840. Exhibit 3 provides data on salary categorized by range. These results indicate that 56 out of 102 are making more than \$60,000 and are, effectively, above the average.

**Exhibit 3: Salaries of Graduates of Columbia University’s Master of Public Administration in Environmental Science and Policy Program**

| Salary Range      | No. of Survey Respondents | Percentage |
|-------------------|---------------------------|------------|
| \$20,000-\$30,000 | 4                         | 4.0%       |
| \$30,001-\$40,000 | 10                        | 10.0%      |
| \$40,001-\$50,000 | 16                        | 15.7%      |
| \$50,001-\$60,000 | 16                        | 15.7%      |
| \$60,001-\$80,000 | 38                        | 37.0%      |
| Above \$80,000    | 18                        | 17.6%      |

When questioned on their job satisfaction on a scale of 1 to 5 with 1 being highly satisfied and 5 being highly dissatisfied, the average score of 123 respondents was 1.87, indicating a high level of satisfaction. Ninety-seven (97) of the respondents or 79% were either satisfied or highly satisfied – a very high success rate.

Our primary indicator of the overall success of the program itself is whether an alum would recommend the program to a friend who is considering graduate school with an environmental focus. The respondents rated the question on a scale of 1 to 5 with 1 being yes with great enthusiasm, 2 being yes with some reservations, 3 being yes with strong reservations, 4 being no probably not, and 5 being no under no circumstances. Virtually everyone said yes; the average score being 1.78. Only 4 out of 138 (3%) said they would not recommend it. This almost unanimous recommendation of the program is an indicator of the program's strength.

The alumni were then asked about their satisfaction with the individual courses of the program on a scale of 1 to 5, with 1 being highly satisfied and 5 being highly dissatisfied. Almost all respondents were satisfied or highly satisfied with the curriculum as illustrated in Exhibit 4. Research Methods and Quantitative Techniques received the lowest average rating of 3.16 followed by Microeconomics at 2.50. Faculty in other public policy programs can attest to the

difficulty we sometimes have in “selling” our analytic courses. We might expect a more positive reaction from alums reflecting on the program, but we do not seem to see much “mellowing”. We do not know if the lower levels of satisfaction are due to the subject matter or the quality of instruction.

**Exhibit 4: Alumni Satisfaction with Courses in the MPA in Environmental Science and Policy at Columbia University**

| Course          | 1-Highly Satisfied | 2-Satisfied | 3-Neutral | 4-Dissatisfied | 5-Highly Dissatisfied | Total Responses | Average |
|-----------------|--------------------|-------------|-----------|----------------|-----------------------|-----------------|---------|
| Climatology     | 66                 | 42          | 13        | 13             | 2                     | 136             | 1.85    |
| Env. Chemistry  | 20                 | 63          | 26        | 23             | 4                     | 136             | 2.47    |
| Ecology         | 38                 | 51          | 36        | 6              | 1                     | 132             | 2.10    |
| Hydrology       | 32                 | 60          | 32        | 4              | 2                     | 130             | 2.11    |
| Env. Policy     | 50                 | 46          | 19        | 12             | 8                     | 135             | 2.13    |
| Workshop        | 97                 | 31          | 5         | 2              | 1                     | 136             | 1.38    |
| Microeconomics  | 29                 | 48          | 24        | 24             | 8                     | 133             | 2.50    |
| Statistics      | 11                 | 36          | 28        | 35             | 22                    | 132             | 3.16    |
| Env. Ethics     | 43                 | 44          | 29        | 13             | 6                     | 135             | 2.22    |
| Public Mgmt.    | 26                 | 68          | 21        | 14             | 7                     | 136             | 2.32    |
| Financial Mgmt. | 45                 | 47          | 20        | 15             | 7                     | 134             | 2.19    |
| Elective 1      | 78                 | 25          | 6         | 1              | 2                     | 112             | 1.43    |
| Elective 2      | 63                 | 20          | 11        | 1              | 0                     | 95              | 1.47    |

The Workshops received the highest average rating of 1.38. Electives were the next two highest rated courses. The course Toxicology was inadvertently omitted from the electronic version of the survey but included in the online survey; it has therefore been dropped from this comparison due to a low number of responses.

One should keep in mind when looking at the results for electives that no electives were available the first year of the program while it was at Biosphere. After the program’s move to New York, electives were gradually brought into the

program, starting with one per year followed by two per year. This may explain the reduced number of responses for electives compared to the other courses, particularly for a second elective. The increase in elective offerings was in response to student demand and also to provide students the opportunity to take advantage of the extensive offerings at the School of International and Public Affairs and throughout Columbia University.

We also asked respondents to judge the usefulness of the courses in their current job, summarized in Exhibit 5. Responses were on a scale of 1 to 3, with 1 very useful, 2 somewhat useful and 3 not useful at all.

**Exhibit 5: Usefulness to Alums of Courses in the MPA in Environmental Science and Policy at Columbia University**

| Course          | 1-Very Useful | 2-Somewhat Useful | 3-Not Useful At All | Total Responses | Average |
|-----------------|---------------|-------------------|---------------------|-----------------|---------|
| Climatology     | 40            | 56                | 29                  | 125             | 1.91    |
| Env. Chemistry  | 24            | 47                | 55                  | 126             | 2.25    |
| Ecology         | 17            | 69                | 38                  | 124             | 2.17    |
| Hydrology       | 23            | 58                | 41                  | 122             | 2.15    |
| Env. Policy     | 63            | 43                | 20                  | 126             | 1.66    |
| Workshop        | 95            | 24                | 5                   | 124             | 1.27    |
| Microeconomics  | 42            | 56                | 24                  | 122             | 1.85    |
| Statistics      | 38            | 53                | 33                  | 124             | 1.96    |
| Env. Ethics     | 11            | 64                | 50                  | 125             | 2.31    |
| Public Mgmt.    | 69            | 41                | 16                  | 126             | 1.58    |
| Financial Mgmt. | 52            | 51                | 20                  | 123             | 1.74    |
| Elective 1      | 56            | 27                | 16                  | 99              | 1.60    |
| Elective 2      | 47            | 25                | 10                  | 82              | 1.55    |

We find that again Workshop is assessed as the top course in the program, not only in satisfaction but in usefulness as well. The data also indicate that although Climatology was a popular course, most found this course only

somewhat useful or not useful at all in their current position. Although most respondents were least satisfied by Microeconomics and Statistics, they acknowledge these courses as useful in their current job.

When asked what they considered to be the most important knowledge or skill area that they learned while in the MPA in Environmental Science and Policy program, alumni commonly mentioned teamwork, statistics, economics, management skills, a basic understanding of environmental sciences, memo-writing and policy analysis. More electives and a greater international focus were given as suggestions for improvements to the program.

When asked for the kinds of services they would like to have available as an alum, many respondents requested career and work-related services. Specifically mentioned were networking events, career assistance, notification of job openings, and speaker and workshop series. Also mentioned were an alumni directory, library access and an alumni newsletter.

Concurrent to the survey, alumni were contacted directly via telephone to update personal and contact information for an alumni directory and were encouraged to fill out the survey. During these telephone conversations, the alumni were also asked if they would allow current and prospective students to contact them. The number of alums who responded positively to allowing current

or prospective students to contact them was much higher than the number of alums who completed the survey and totaled 222 of 306 graduates.

## **5.0 Conclusion**

Self assessments are known for being unreliable and self-serving. We suppose we are guilty of the latter but hopefully not the former. These data provide an indication that the program is succeeding. Its graduates are employed and many are well paid. It tells us that our workshop sequence is quite successful, but that we need to improve our economics and quantitative analysis core offerings. We also see among our alums a deep commitment to the program's students and a willingness to serve as mentors.

With the program now in its seventh year, its faculty are in the process of examining the current curriculum and considering potential improvements. Most of those changes will take place within the current curricular structure, but in all likelihood we will also consider some modest structural changes to the curriculum. This initial feedback may be positive, but the greatest danger in educational programs is the tendency to stand pat and relax. Given the dynamic nature of the environmental field, complacency is not a good idea, and we expect that this program will continue to evolve.