Commerce, Research, and Conservation: Contributions and Challenges of Marine Extension Work in the Puerto Rico Sea Grant Program

A thesis submitted to the University of Michigan Department of Anthropology by

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Preface

I am a graduating senior with a double major in Psychology and Anthropology from the University of Michigan-Ann Arbor. I began this extensive project as I became interested in the research applications of the fields of cultural anthropology and natural resource management in the winter 2004 during my third year of college after taking an applied cultural anthropology and environment course taught by Dr. Rebecca Hardin. This cross listed class in Cultural Anthropology and Natural Resources departments introduced me to interdisciplinary work between these two fields. I saw how anthropology with its extensive theoretical framework, qualitative methodologies and use of culture as their object of study related to environment as it is conceived in natural resources, in a more applied form, and still related to culture, this becoming my way of establishing an interdisciplinary view of these two fields. By winter 2004, when I was finishing my junior year, I was also clear that I wanted to do an independent project as the undergraduate honors thesis before I graduated from the University of Michigan-Ann Arbor.

In the early summer 2004, I made a casual short trip home to Puerto Rico and by chance I visited the *Puerto Rico Sea Grant Program* in the University of Puerto Rico at Mayagüez. I was welcomed there by all the Puerto Rico Sea Grant staff, especially Manuel Valdés-Pizzini, PhD and Ruperto Chaparro, MA. This environmental US national program fascinated me for its integration of extension, education and research. Moreover, during that summer 2004 I was defining my potential undergraduate honors thesis subject and Sea Grant casual visit turned out to be later my research framework.
I wanted to have an interdisciplinary and applied original research piece of work for my undergraduate thesis as well as to work on my island, Puerto Rico, and the Sea Grant provided me the infrastructure for this. I took the Sea Grant as my groundwork to combine ideas of culture and the use and the sustainable management of coastal and marine resources and these aspects related to the vibrant yet challenging position of the Sea Grant marine extension agents –the heart of this study.

Acknowledgements

This research project has been possible with the support of multiple undergraduate grants that I have received as an undergraduate at the University of Michigan-Ann Arbor (UM) to cover my research expenses. The various grants at this university were: International Institute Individual Fellowship, Literature, Science and Arts Honors Program Travel Grant and the Anthropology Department Undergraduate Research Grant. Furthermore, since this is part of a multi-site historical project, it could not have been completed without the permission and support, including financial support of: Michigan Sea Grant, Puerto Rico Sea Grant and the National Sea Grant Programs.

I am privilege to have as my thesis advisors at the UM: Rebecca Hardin, PhD and Julie Skurski, PhD. Rebecca, I am sincerely grateful for all your unconditional support not only on this project but in the many facets of my life. Also, thanks to Manuel Valdes-Pizzini, PhD –my University of Puerto Rico mentor. I have been most cordially welcomed at the University of Puerto Rico at Mayagüez because I had your support as my mentor for this project as you are an experienced Puerto Rican applied anthropologist in coastal and marine resources.

I am very grateful to the Puerto Rico Sea Grant Program, and its wonderful staff! I have had a wonderful year and a half of interesting conversations with many of the you. In particular, I appreciate the time and efforts of Ruperto Chaparro, MA, María Font and María Matos. I was always warmly received and integrated in the office by everyone. I also thank the respondents of my oral histories who were willing to participate in this study!

To the various people who have contributed ideas, input, proofreading in English and other needed tasks to complete this thesis article like my nuclear family (dad, mom and siblings), friends (especially to Sarah Notestine, Margaret Wright, Andres Berg, Sameer Hamdam, Angel D. Samalot-Quiles), Prof. Charles Taylor and Advisor John Marshall from the Comprehensive Studies Program at the UM, Agnieszka Kowaluk and Prof. Judy Dyer from the English Language Institute, Prof. Mary Annette Moreno at the University of Puerto Rico at Mayagüez and the Sweetland Writing center at the UM (mainly George Cooper, and all the tutors who helped me). Zoribet Matos assisted me with design for many of the graphics in this document, including the front page.

In particular, my gratitude goes to the Michigan Sea Grant Program and the National Sea Grant. Although those programs are not noticeably part of this thesis, currently I am developing a recent history of their Sea Grant extension, and I want to recognize that these programs have always welcomed me to access the resources and staff needed!

I dedicate this work to all the marine extension agents who have, are working or will work with issues of coastal management and tourism. Your work is precious and very critical to find adequate solutions to changing dynamics on marine and coastal resources around the world. Extension work is critical for the stepping outside the box toward creative and valid alternatives to solve these issues!

Chapter One

Forging Alliances in Rapidly Changing Coastal Worlds, Marine Extension

> The extension agent needs a theoretical grounding.[1] As an extension agent, I never got training but I learned in doing. Interview notes 001[2]

This quote, offered by one of the agents interviewed in this study, reflects a contradiction that was much repeated by others. Commenting on the ability to learn in the day-to-day on how to become an extension professional was a common impression among the participants of this exploratory study. Moreover, today this past agent uses his extension agent's experience to apply to a non-Sea Grant position offering training to other extension agents on how to prepare extension professionals at the National Oceanic and Atmospheric Administration, which is also similar to other past agents.[3] This repeated comment shows that the marine extension agent work combines a set of skills, preparation, work experiences, and training to manage the difficult undertaking of natural resource management, in particular of the coastal and marine areas. Mediating among stakeholders, balancing different interests on marine and coastal resources, managing various groups with diverse academic, social, economical and political backgrounds, and

[1] The format used for quotes from the oral history in this thesis is going to be first the quote and then offer a brief summary of the description of the participant who said that quote as a footnote. This is for the most part the format used throughout this paper, unless otherwise noted.

[2] The agent worked for six years in the 1990s in the Puerto Rico Sea Grant and he is not currently in the program. He worked in the 1990s at the Puerto Rico Sea Grant Virgin Island office and attained various certificates in training design, adult education, facilitation training and collaborative process design. This agent studied a BA in the Caribbean and a PhD in marine sciences in PR.

[3] Also, note that each citation taken from oral history phase and their use inside the text has a descriptor. There is a difference between tape-recorded interviews (cited as interview transcripts) and handwritten notes (cited as interview notes). There were a total of 15 semi-structured interviews in PR. There are no names or descriptions included that may allow for identifying participants to follow confidentiality purposes. The oral history phase was analyzed in conjunction with an archival work phase that allowed for the analysis and examination of the historical material as well as to make participant observation notes.

aiming for a participative decision-making process are examples of the tasks done by a marine extension agent in the island of Puerto Rico (PR).[4]

This thesis examines some aspects of the changing role and conditions of the work of marine extension agents in Puerto Rico over the decade of 1980s to 2000.[5] Within the context of national and global trends in increasingly complex intersections between scientific knowledge, managerial practices, and changes in environmental stewardship management, the marine extension agent work is examined looking at the Puerto Rican context and the Sea Grant (SG) idea.[6] In order to study the recent work history of the Puerto Rican marine extension agents, four major research questions were considered:

1) How do extension agents view their role in the Puerto Rico Sea Grant and in the Sea Grant program?[7] How do they view the conditions of their work?
2) How do their views compare to the accomplishments by the Sea Grant administration and internal inquiries? How do their views reveal conditions documented in Puerto Rico (e.g., social, cultural, political, economic, etc)?
3) What kind of strategies do agents develop for the management of specific coastal and tourism related projects?
4) How does the Puerto Rico Sea Grant coordinate their work and collaborate with other "college" programs and with the National Sea Grant?

Puerto Rico, like other tropical islands, has a large extension of coasts and many issues such as coastal gentrification that sets a stage for conflicts among different groups that have different interests on the same resource, the coast. This intersection of various

[4] PR will be referred in various ways: island, US territory and PR.
[5] This research project is a work in progress and this thesis is just the first product of the project. I also completed field work in Michigan Sea Grant during the summer 2005 to compare the PR project to the Michigan project and will complete in winter 2006 at the national office. The final product is a multi-site piece between the PR, Michigan and the national Sea Grant offices planned to be completed by 2006.
[6] The work from Marylin Strathern (2000), Don Brenneis (1998) stand in here as a partial framework for the concepts of audit cultures, accountability and 'knowledge culture'.
[7] PR Sea Grant College Program is referred in various ways: PR Sea Grant, PR program, UPR Sea Grant, UPR College Program, PR local program, local program, and PR agents.

groups creates an ever-increasing state of conflict among these coastal stakeholders. An example of a conflict among coastal stakeholders in Puerto Rico is Costa Serena; this example will be used to explain briefly what a marine extension does.

> Who does not know about Loíza[8]? People know Loíza[9] because of its 'kioskos' with … 'frituras[10]' next to the beach, or because of the 'vejigantes[11]'….or because of its high-incidence of crimes, or for the conflict between environmentalists, coastal communities, the Puerto Rico government and the developers for a new construction project: Costa Serena (Serene Coast).
>
> González, Joanisabel
> 2005. Ventana al desarrollo de Loíza (Window for coastal development in Loíza). El Nuevo Día. Revista Negocios (Business Magazine). p.10-13. Sunday Sept 11 2005[12]

This quote represents a concrete example of the need for coastal conflict resolution similar to what a marine agent does. Costa Serena is a proposed construction project that a developer in Puerto Rico (PR) hopes to construct in the land he received from his grandfather, Luis Puro. It is a tourism project that will have 880 acres of land in a hotel, 42 housing units, five pools, one spa, one casino and 1,394 parking spaces among other attributes. The developer has the commitment to build this project under the best environmentally and socially friendly parameters to Loíza, the PR municipality where this project is planned to be located.

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[8] Loíza land area is 65 sq km (25.0 sq mi); population- 31,854; density- 500.5 per sq km (1,301.4 per sq mi); housing- 10,927; per capita income: $5,283 and from the population able to work 63.5% is unemployed (US Census, 2000). Loíza is a 'municipio' of the island of PR. Each municipality or 'municipio' is governed by a popularly elected mayor and municipal assembly.

[9] Settled by Nigerian slaves of the Yoruba tribe in the 16th century, Loíza is a center for African-inspired traditions, retaining one of the highest percentages of African descendants of all island municipalities. Many in Loíza live below poverty compared to the rest of the island.

[10] Fritters in English. 'Frituras' are very typical in Puerto Rican cuisine and represent a strong form of Puerto Rican cultural identity.

[11] Each year there is a celebration in Loíza where people in a parade wear *Máscaras de Vejigante*. *Máscaras de Vejigante* are a special type of mask made in Loíza made of coconut and painted in multiple colors. A very typical part of Puerto Rican culture.

[12] El Nuevo Día is a well-known and the most read newspaper in the island.

Map from http://www.worldatlas.com/webimage/countrys/namerica/caribb/pr.htm (last accessed August 2005)

The Costa Serena concept was born in 1997 and it is not until today, 2005, that its construction can reasonably be planned to begin next year, in 2006. This project has been very unique compared to regular urban or tourism project developments in Puerto Rico. Although the project passed repeated rigorous assessments, as it is required by the Puerto Rico government monitoring agencies, it is the developer 'willingness' to make of the project one that is environmentally and socially friendly to Loíza what makes this project unique. In fact, the project has adjusted its proposal many times to commit to protect the environment (e.g., to respect the beaches and its public access, the mangrove, and the species living in the affected zone), the 'loiceños' or the townspeople (e.g., to avoid relocation processes, to offer employment, etc.), and to follow regulatory mandates from

the Puerto Rican government. Many of the project's amendments reflected the nature of the complex process that calls for marine extension agent mediation for a sustainable coastal development and proposed projects.

The question is whether this tourism project will benefit the state of affairs that this 'municipio' has. In fact, the developer explains, "this project [has] two areas that are relevant for the tourism: the Convention Center and the other targeting the 'relaxation culture' who aims to escape in their vacations to be in touch with nature." The project is proposed in a 'municipio' that has: budget deficit, where few factories and some businesses contribute the fiscal year, the majority of the housing is exonerated from its financial contribution, where little more than half of the population graduate from high-school, unemployment is high and the majority of the families are single mother homes (El Nuevo Día 2005). Loíza seems to need much more than Costa Serena to positively influence the 'bacalaíto economy' and it makes a legitimate call for the work of marine extension agents (El Nuevo Día 2005).[13]

> *I was asked to go and teach the artisanal fishermen as we called them …I believe now they [people who still works at the Puerto Rico Sea Grant] called them commercial fishermen…I have never done any fishing before in my life…I only had a master's in marine sciences and I needed to go and teach the fishermen…tough task! My strategy was to establish rapport with the fishermen. I went everyday to establish a relationship with small steps and build trust with the fishermen so I could do my job. I remember the first time I went there when I introduced myself…Hi! My name is…and I am from the Puerto Rico Sea Grant Program….the fishermen were tired of just listening to that….here he comes another person from another program …*
>
> Interview transcript 015
> Note: See opening section on chapter two for background information on this quote.

Coastal and marine resources are numerous and their management is still relatively unfixed: there is no one simple way to determine the fate of these valuable resources. Who decides what will happen next in natural resource and coastal

[13] Bacalaíto is cod fish fritter very typical from Puerto Rican cuisine and that is easy to find near Piñones, a beach-town in Loíza. Bacalaíto represents one of the prime forms to attract tourism as well as strong form of Puerto Rican cultural identity.

management? Who decides how coastal problems will be managed? What will happen if we lose significant types of coastal and marine resources as is happening to other kinds of ecosystems at present? How do coastal development and tourism relate to current and future resource management needs? These are a few of the many questions about natural resource management remaining unanswered. Nonetheless, marine agent's in Sea Grant main purpose includes setting up the infrastructure to manage the fate of coastal and marine natural resources. Therefore marine agents not only mediate and have conflict resolution skills but also their training provides a "bottom up" or outreach model to become trustworthy sources of scientific information for Sea Grant and the public.

> [Marine advisors] are the closest thing to real outreach…since I'd been working for a federal agency. The agents spent time on the docks talking to fishermen…they know the fishery gear repair owners and the fishery management officials. They give workshops…they introduced the latest diesel engine…They know their constituent group intimately and work with them on a daily basis … -- not in a federal office behind the stacks of paper.[14]

Marine agents in Sea Grant are, at their best, useful non-advocate liaisons between the natural resource management institutions and the decision-making processes of coastal development and tourism. An agent's main purpose is to facilitate negotiation between all stakeholders involved with coastal and marine resources. This means influencing changes in people's knowledge, attitudes, skills and practices. Providing scientific information, translating that knowledge into spoken language and educating

[14] Shirley Fiske is a cultural anthropologist and Program Director [1990] for Social Sciences, Marine Policy, and Education for the National Sea Grant program in Washington DC. She coordinated closely with marine extension and is dedicated to improving the use of social science information in managing natural resources. See her 1990 work: Anthropology and Marine Extension: Can we make a difference? *Practicing Anthropology*. 12(4)4.

various groups are other duties of an agent's job. Moreover, a marine extension agent's major responsibility includes promoting the conservation of marine and coastal resources, but making that conservation effort suits local needs and attitudes. These are no small tasks in a place like Puerto Rico, a tropical Caribbean island, which faces one of the most rapid coastal and tourism developments in the world, thus pressuring the already ecologically sensitive coastal systems.

One of the agents declared:

Depending on whose designation of how to define a coastline, islands like Puerto Rico, a US territory, can be considered entirely as coast. Puerto Rico is therefore no exception to the pressing issues facing the coast all over the world; more than 80 percent of its citizens already live near or on the coastline, which makes the study of its coastal development an especially vital concern.

Interview transcript 003
Note: See section titled *The Survival of Small Programs within Large Networks* later in this chapter for background on this quote.

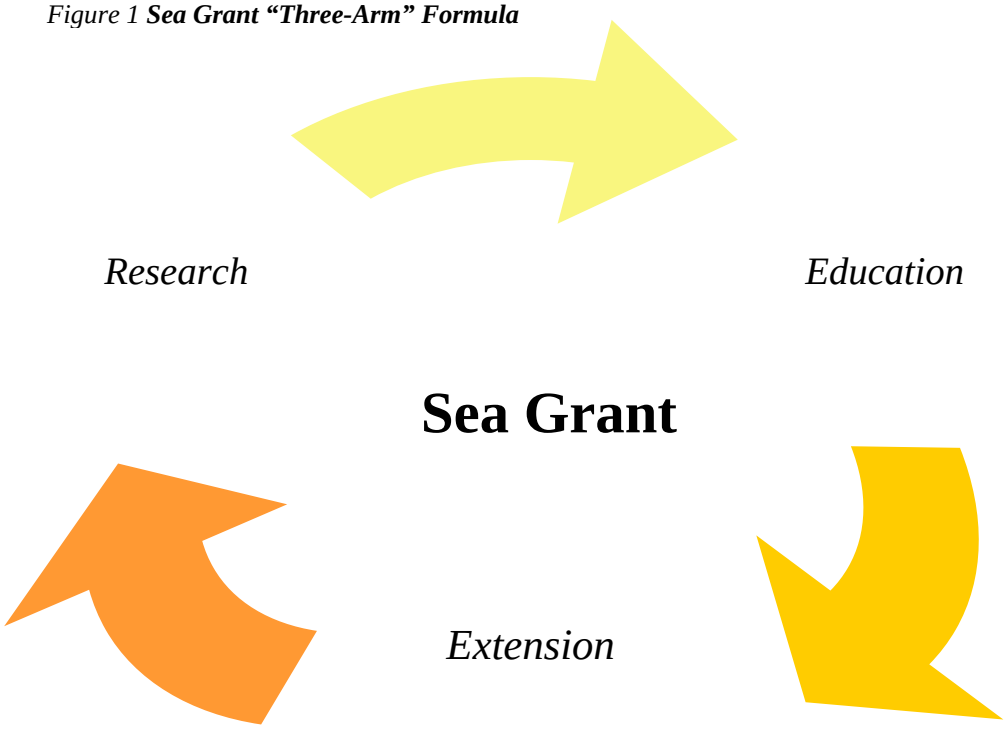
The Sea Grant (SG) is a United States (US) national environmental federal program that encourages the wise stewardship of marine and coastal resources.[15] Sea Grant's mission is three-fold: scientific research as a primary activity, economic growth and environmental stewardship, in order of importance.[16] Each of these mission goals represents a distinct set of institutions, or interests, in which the production of knowledge is differently conceived and disseminated. The primary goal of SG is the production of research. Today, research has become the prime mode and the most valued form of expanding our knowledge, and SG aims to use academic research as the engine to

[15] PR is a United States territory that as the result of its US-PR political relationship allows the placement of the US federal programs. Sea Grant will be referred in this thesis as National Sea Grant, National Sea Grant office, National office, Sea Grant, and SG.

[16] See Figure 1 page 8. Each of these goals are set in Sea Grant model in the following way: research is mandated by National Sea Grant to receive at least 50% of their local budget for this purpose, Sea Grant is part of the NOAA –which represent the environmental stewardship and US Department of Commerce which represents the economic growth. The three goals will be referred as three core goals, three core mission goals and three-tier goals. These goals represent the Sea Grant's mission statement.

among its "three-arm formula": extension, education and research.[17] The goal of economic growth can be explained through its location within the National Atmospheric and Oceanic Administration (NOAA) under the US Department of Commerce (DOC). Having this position within the US federal government makes SG to endorse economic growth and need to justify the investment made by the US Congress on its operations. Research linked to the commerce goal turn into fundamental and primary aspirations of the program. Finally, through environmental stewardship, Sea Grant hopes to act as a steward of natural resources, specifically the US coastal and marine resources: striving for their sustainability.

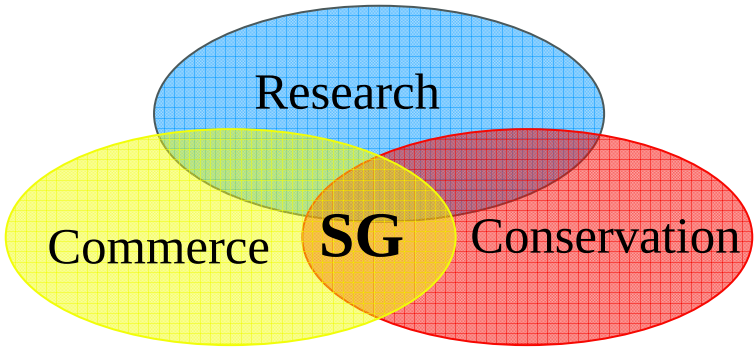
Figure 1 ***Sea Grant "Three-Arm" Formula***



[17] Each of these arms is a strategy to achieve Sea Grant's major goals. The three strategies will be referred to by various sources quoted in the text as the three-arm formula, and three-tiered or three core strategies.

Sea Grant's three core goals (i.e., economic growth, scientific research and environmental stewardship, or conservation) may contain some internal contradictions (see Figure 2). Each goal has specific sets of ideas, institutions, interests and actors that may be, or may historically have been, in conflict with each other. For example, economic growth aims to achieve a profitable use of coastal and marine resources to create profit or economic revenues like employment, whereas conservation may largely support the needs and voices of those who have an interest at stake in the same resources and may not necessarily result in profits.

Figure 2 **Sea Grant Three core Goals**



Extension as a strategy to achieve some balance between the Sea Grant's three core goals is the focus of this study.[18] This research, not an assessment but rather an ethnographic and historical study, examines how the Sea Grant's three core mission goals came to be, particularly with respect to the role of extension work in the history of the Sea Grant; and how these three goals make good extension work indispensable and rewarding, but also sometimes difficult, or even nearly impossible.

Anthropology, Extension and Natural Resource Management Challenges

> Anthropology is particularly important because of the social change issues accelerating along the coast of the US: with increasing population come gentrification, displacement, and marginality of traditional communities. Along with the dollars and jobs of economic development come problems such as demands for services, transiency and pollution. …Anthropology with insights and skills in social change, mediation, and understanding community-based resource management systems, is ever more critical to protect and enhance the use of our coastal areas.
> Fiske, Shirley
> 1990. Anthropology and Marine Extension: Can we make a difference? Practicing Anthropology. 12(4)4.

Shirley Fiske, an anthropologist by training, explains the value of integrating anthropology and extension in today's world in the piece from which I have quoted, above. She can see "avenues of opportunity for anthropological contributions to fill gaps in current extension practice"(Fiske 1990:4). She goes on to say that anthropology and

[18] The use of various terms to refer to the same program or position in SG has been confirmed by the archival work and oral history phases of this research. In PR Sea Grant (and others) the following concepts were used to refer to extension: Marine Advisor around 1970s-1980s; Marine Outreach Professional around end 1980s and 1990s and Marine Agents around the end of 1990s until the present. The same pattern is true for the name of the extension component in SG's mission. For example, Marine Advisory Service (MAS) is used around 1970s and 1980s; Marine Outreach Program (MOP) around end of 1980s and 1990s and Marine Extension around 2000s until present. The major difference between PR and other Sea Grant Programs including the National office is that the last change to the concept of extension will also have an internal structural administrative re-accommodation link to it. For instance, MAS and MOP were structured as any other outreach or independent SG component but the change for Marine Extension integrates communications, education and extension. This last accommodation is not representative of others Sea Grant programs.

social sciences are able to provide social theory, skills and potential opportunities to work as part of the extension system, working closely with the agents or researchers in academia. Fiske agrees with Don Brenneis (2004) on his reflection on the role of anthropology in today's world.[19] Brenneis argues that the role of anthropology is very applicable to the field of extension because, in his words, there are an "increasingly complex intersections among scholarly knowledge, managerial language and practices, and private capital (Brenneis 2004:580-581)." Such framing shows us how an analysis of Sea Grant, with its espousal of occasionally contradictory three core goals, can reveal more than just the future of coasts, but also something about changing environmental politics more broadly defined.[20] The analysis of Sea Grant can reveal the setting where "new regimes of efficiency, audit and accountability" are expected (Strathern, 2000).[21] Similarly, in the spirit of Brenneis' observations, the marine extension program and agent can act as paving the way for smoother intersections and collaborations between capital, knowledge and management. Yet, as I shall suggest, extension can also offer alternatives to communities and institutions seeking to understand and mediate in a complex world of increasing integration, on one hand, and dangerous alienation from access and use of the resources, on the other.

In the last decade of the 20th century, the US added 33 million people to its population, with over half of this growth occurring in just seven coastal states (National

[19] Don Brenneis was the last President of the American Anthropological Association in 2004 and is a faculty member at the University of California.

[20] This is where the work from Marylin Strathern (2000), Gordon (1980) describing Foucalt's ideas and Mary Catherine Bateson (1990) become key theories to explain the transformation that affect the marine agents in the changing scenario of environmental politics during the last 30 years in the US.

[21] Dominic Boyer in Anthropology News in his article Productivity, Professionalism and the Academic Labor Market in Anthropology published in 2003 summarizes the following idea about Strathern's work: "Marylin Strathern has written recently of the presence of an "audit culture" in academia –a regime of institutional accountability where scholarly value is determined by productivity, and productivity is supposed to be measurable in the abstract (through "units" of teaching and writing and service)."

Sea Grant, 2002). Because of the rise in population, coastal communities are facing increasing demand for seafood, oil price peaks, conflicts between coastal users over recreational and industrial purposes, heightened trade, lack of 'subsistence' on fishing industry, water pollution, increase on urban and coastal development, and rising sea levels. The National Sea Grant Office is aware and affirms that coastlines are facing severe challenges as "shorelines are in high demand for recreational, business and residential development (National Sea Grant, 2004).[22]

To respond to the challenges of coastal and marine resources raised by development, the SG program was born in the 1960s. In order to understand the Sea Grant program we must look at the historical development of the time when Sea Grant was created --1960s-70s in the US. For example, one key aspect to consider is Sea Grant's predecessor, the Land Grand College Program, a university-partnership established by Congress in 1862 for the development of agriculture. Land Grant College Programs developed and expanded agricultural technologies through three major approaches: research, education and extension. One of the major achievements of Land Grant was the creation and implementation by mid 1900s of an extension program to incorporate people's voices and participation in the decision-making process. By creating extension, Land Grant supported that people influenced the decision-making process and their critical participation allowed to become involved, to obtain an increasing awareness and to attain the desire for action, as it happened in the US near the 1960s.[23]

[22] As this study is part of a work in progress, a series of additional products (i.e. a multisite study) are expected to be completed by December 2006. The preliminary findings of this project will be presented at two conferences: Caribbean Studies Association last May 2005 in Dominican Republic. Also, the project has been accepted for the Annual American Anthropological Association Annual Meeting in Washington DC from November 29-December 2, 2005.

[23] Major US social movements simultaneously happened during this time (ex., civil rights, environmental movements, etc). The Land Grant before 1960s created and implemented the extension or their new third

Unlike the Land Grant, SG conceived extension as one of the main three-tiered approaches since its origin in the late 1960s. Employed by the SG program, marine extension agents are the link between all the areas and stakeholders, or everyone with a general interest (or "stake") in the coastal and marine resources. "Stakeholder" applies to people who influence or can influence a coastal management decision as well as those affected by it. A stakeholder can be a local coastal community, community leader, marina manager, environmental group, coastal resident, developer, government, state, hotel manager, etc. In this case, marine extension agents accomplish the major responsibilities of "communicating" across the Sea Grant's massive national network of 32 offices in the US, and mediating and facilitating the ongoing discussion of coastal and marine issues around the world.

During the decades of 1960s and 1970s the US public had their attention on environment, environmental politics and legislation. Simultaneously, at that time there was constant transformation in the government, the academy, industry and society, all respective to a changing period of time where the nature and vision of one another did not mesh seamlessly and most often established hierarchies of status and power through their development.[24] This transformation raised questions about the politics of knowledge that have long affected the conditions of extension work in general and in this case of the agent's job in particular. Many of these questions are beyond the scope of this essay, though I will address some issues related to these complex transformations. These issues

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arm. However, this last arm becomes relevant as there was an increasing awareness and interest in environmental issues in mid-1900s near the end of Second World War and 1960s, which is also when the SG is formed.

[24] In a world were efficiency, audit and accountability are anticipated, the politics of knowledge and circulation will be transformed as a result of these new set of goals.

are like the tips of larger icebergs, beneath the surface and yet shaping the navigation and reactions of those above, reminding us that neither science nor community exists in an ideal independent world, but an interconnected one.

Of course, extension agents are not a perfectly homogeneous group. They come from many different backgrounds with respect to the issues cited above. The agent position draws upon an understanding of the locality at a deeper cultural and social level; the agent learns in doing their day-to-day work. Furthermore, those who pursue an agent's profession recognize that their position is not a habitual or regular job, but that it requires particular social and communicational skills.

The Survival of Small Programs within Large Networks

> The Dominicans say being white is a profession. I believe there is discrimination--not ethnic discrimination, but towards small Sea Grant programs. This situation is going to affect Puerto Rico Program. Although I think Michigan is also a small program inside the Sea Grant, this fact will particularly affect us in PR because the national Sea Grant is moving to a more specialized research-oriented outlook. [Considering that PR's strongest asset is their marine extension versus others where there is research] and considering that PR has not, and will not be able to find matching funding for extension [considering that is not the Sea Grant priority; instead research is], Puerto Rico will be at a disadvantage relative to other Sea Grant Programs. Then when the US federal money comes and the national Sea Grant assessments, our evaluations will show this gap and our Sea Grant federal funding will be lower than before and at that point too little to operate. Interview transcript 003[25]

Sea Grant's vast size, having a nation-wide network with 'autonomous' local offices all over the US, raises one of the most evident challenges: how to keep all these

[25] First an advisor and today an agent, she was born and raised in Puerto Rico. Passionate with the ocean and fishing decided to pursue social sciences to integrate the sea and culture into marine and coastal management. She studied a BA in PR and a PhD in the United States. Then, she decided to return to the island to practice the career and joined Puerto Rico program back in 1980s as a marine extension agent. During the time at Puerto Rico program moved from extension agent, administrative and research positions. The person worked for 20 years in the program and today still works in the program

experts and offices with the most up-to-date information about each other's work and to encourage them to engage in collaboration or partnerships. Besides Sea Grant's nation-wide size, US federal funding (e.g., how to apply, who receives it and how to monitor what each office does with the funding received) become another resulting challenge for this national NOAA program.

In addition, the National office establishes its mandates and it must be considered and followed by each of the autonomous SG local offices (e.g., 50% of each local office funding comes from the national office or the US Congress allocates the Sea Grant money under the Sea Grant Act).[26] Therefore having a close relationship to the national office guarantees a relation to the network. The US national mandate may raise another challenge: how to make local problems "fit" into the US national agenda in natural resource management. On one hand, the national Sea Grant mandate has many themes, areas, strategies and philosophies and it is often broad and general, which allows each local SG program to integrate their local problems effectively into their strategic and implementations plans.[27] On the other hand, if the local program has to deal with other conditions or problems that do not apply to the national mandate, there is a possibility to lose funding for not supporting the US national mandate. Besides, as 50% of the total funding comes from the National office, having a local plan that corresponds with the national mandate may also affect the 'autonomy' status.

The Sea Grant Network promotes that the National Sea Grant office has some established administrative role in relation to local Sea Grant offices but not others. For

[26] The National Office is referred as National Sea Grant office, and National office.
[27] Each local Sea Grant office must develop annual and bi-annual as well as five-year strategic and two-year implementation plans. Although in the early SG years the requirements and the structure and requirements were different to the present, there has always been a requirement for planning and reporting as part of the accountability to receive funding inside the Sea Grant Network.

example, in the previous paragraph we learn that funding and allocating at least 50% of the local Sea Grant funding is one of these established roles.[28] Also, the relation of the Puerto Rico Program to other Sea Grant local programs is almost exclusively established through the Washington based National Office Sea Grant Network. Having a connection to the national office guarantees the funding and support part of the Puerto Rico Program operations as well as for the most part provides evaluation, peer-review and assessments and many external review advisory boards. This more dynamic large external advisory partnership, and less of a funding source, administrative role between the national and local Sea Grant offices makes possible the achievement and assessment of the Sea Grant mission, in particular at the local level competing with the US national Sea Grant and NOAA mandates.

In short, the relation of the Puerto Rico Sea Grant to the national office and their tri-partite mission –commerce, research and conservation- is attached but not fixed. This local university-National Sea Grant partnership does not necessarily secure Puerto Rico office to communicate regularly to other local SG offices where extension agents manage similar (or different) issues. Having no direct connection to other local SG offices raises a major barrier to the Sea Grant Network because one of the core ingredients in their Sea Grant formula is national collaboration and partnership. Collaborations and partnerships are not "a given" when Sea Grant local programs become part of the Sea Grant Network which may be different than the National office association.[29] Further connection on this

[28] The Sea Grant Network refers officially to the Sea Grant Association (SGA), the National Sea Grant Office (NSGO) and the National Review Panel (NRP). Also, as Jim Murray, PhD-Former Extension Director at the National Sea Grant Office presented in 2004, this network can be conceived as the National Sea Grant Office (Federal), 30 Sea Grant programs (Non-federal) where each Institution conducts integrated: research, education and outreach (extension and communications); Sea Grant Association of Program Leaders and Sea Grant Review Panel. This Network will be discussed in detail on chapter two.

[29] The implications of these non-established roles for National Office are beyond the scope of this thesis.

topic of how small programs survive in such massive network is discussed in detail on chapter four where the voices or the findings of this study are presented.

Small, yet Significant: the University of Puerto Rico Sea Grant

> We have had challenges and we always will….we will continue having them. We are a tiny program and we do not have the adequate funding for the number of staff that we need to be able to accomplish our goals. We have material to publish five or six books every two years, but we cannot publish five or six books every two years because we need to do our day-to-day activities, and that limits us in what we can do. With the money we have, we need to distribute the money into our projects and we still hope to produce more… Interview transcript 005[30]

"We are a tiny program…" this quote echoes the size of the Sea Grant Network and how the University of Puerto Rico (UPR) Sea Grant is a small program within the 32 university-partnerships that make up this massive organism. Because the Sea Grant programs have different statuses, funding (e.g., total funding available and sources), internal dynamics and number of employees makes the comparison of any two or more Sea Grant offices a difficult one. Puerto Rico is only an example that may apply to other local SG offices. Puerto Rico is a small SG local program at various levels, including its number of employees, budget, resources, size and location inside the UPR and National Sea Grant Network.

This exploratory study has an ethnographic cultural emphasis that also seeks historical roots of the complex challenges of coastal management and tourism in marine extension work. Puerto Rico occupies a unique position regarding both marine extension work and coastal management and tourism issues. Yet it illustrates well several of the Sea

[30]This agent is part of the newly integrated extension program and joined by the end of 1990s. He has been in various roles as a head of one of the Sea Grant components (i.e., communications, education, extension, research) and in administrative roles.

Grant program's unresolved tensions among the goals of commerce, research, and community based conservation. I examine the conditions under which Puerto Rican marine extension agents work, paying particular attention to how they rely on (or, sometimes, resist) particular types of strategies, goals and concepts to negotiate the difficulties of their daily work and the tensions that are inherent to their extension mission.

This research study examines the work ideals and practices of some aspects of the changing role of extension agents in one regional context, Puerto Rico, with regard to social, economical, political and cultural aspects. The role of the Puerto Rico Sea Grant program will be examined in light of the National Sea Grant Program and its national agenda. The role of the Puerto Rican marine extension agent will be investigated, limited to the SG themes or areas of coastal management and tourism.

Using qualitative and anthropological frameworks, I explore the different dynamics, decision-making processes and views of these actors within this environmental national program. This recent work history of the marine agents is divided into five chapters.[31] ***Chapter Two- A Brief History of the Sea Grant: From the US Environmental Movement*** discusses the creation and development of the Sea Grant Program primarily in the US; ***Chapter Three- Puerto Rico: A Microcosm of Plural Coastal Worlds*** examines Puerto Rico's coastal management including the history of the Puerto Rico Sea Grant; ***Chapter Four- Marine Extension Work History: Local Autonomy versus US National Mandate*** analyzes the narratives and describes the history and changes over time of the work

[31] This research is referred in various concepts through the thesis: recent history, historical analysis, qualitative research, ethnography, exploratory study.

conditions for the Puerto Rico marine extension agents.[32] It looks closely to four areas: job description, work demands, agent's work ideals and the practice of marine extension work in the decades of 1980s to 2000. Finally, ***Chapter Five- Marine Agents, Extension Work, and Environmental Governance of Coasts*** concludes with broader issues in coastal management and extension, local Puerto Rico challenges and recommendations and points of potential collaboration among Puerto Rico, the Puerto Rico Sea Grant and the Sea Grant Network.[33] Most broadly, chapter five considers the role of extension work in environmental conservation and as a non-advocate and in natural resource management.

[32] A work history looks at single stories, in this case, stories said by Puerto Rican marine agents. This study looks at the marine extension employment and circumscribed history of their work within the marine extension and the PR Sea Grant program.
[33] The Sea Grant Network is explained in detail on chapter two.

Chapter Two-
A Brief History of the Sea Grant: From the US Environmental Movement

> Puerto Ricans are ignorant of the resources that I consider the most important [coastal and marine resources]…I am not saying this remark on a negative note but to understand that many times Puerto Ricans damage the environment without knowing the real damage they have done or will do in the near future to the ecosystem…Interview transcript 015[34]

Sea Grant's three core goals of research, commerce and conservation and its three-pronged or 'three-arm' strategy of education, research and extension entails a multi-level and comprehensive approach that is an unusual response to the complex and interconnected world and the management of natural resources today. This chapter offers some general information on how the Sea Grant program (SG) works, how the extension program is crucial to its model and the benefits to regional sites --especially to the universities therein of participating in the Sea Grant Network.[35] The chapter closes with some challenges that occur for these SG institutions and actors in the participating Network.

Spoken by one of the first marine agents, the above quote addresses both the Puerto Rican's ignorance about the role and value of natural resources and their confusion or lack of awareness of programs at the scale of the SG. The quote also betrays some of the problematic and sometimes patronizing relationships inherent in what we have called, in our brief introduction or chapter one, the "politics of knowledge." The

[34] The marine advisor was born in Puerto Rico. The advisor studied a MA in marine sciences in PR and a PhD in the US. This advisor was one of the first extension agents in the beginning of the 1980s who work for about three years at the Puerto Rico Sea Grant and is not currently in the program. After Sea Grant, the agent decided to stay in the US due to higher salaries and better conditions at the workplace

[35] The Sea Grant Network refers officially to the Sea Grant Association (SGA), the National Sea Grant Office (NSGO) and the National Review Panel (NRP). This Network will be discussed in detail later on this chapter. For the purpose of this research study, Sea Grant Network refers to all the organisms and resources that Sea Grant staff and programs have available and these resources are beyond these three official organisms.

dynamics of these politics of knowledge may create one of the biggest obstacles for effective environmental stewardship –SG's backbone.[36]

Puerto Rico, like many Latin American and even other developing countries, presents different flows of knowledge than do many developed ones.[37] As we will see here, SG is a United States (US) comprehensive model that reflects a history of close links between well-funded research processes and large scale agricultural and other practices designed for efficient environmental stewardship. Nevertheless, the development of SG programs has proven possible in contexts like Puerto Rico and the US Virgin Islands --in large part due to their socio-political and economical relationship to the United States.

This exploratory research work uses "ethnography in/of the world systems" (Marcus 1998). This methodology is simply signaled here as it becomes relevant for this study; it is through the multi-sited ethnography, or world system perspective, that this exploratory project is achieved (Marcus 1998). Puerto Rico and the US Virgin Islands, two non-US mainland contexts, illustrate well some of the challenges of putting Sea Grant philosophy into practice both inside and outside the United States, a perfect setting for a multi-sited project. Many of the people who work there seems to not have a clear understanding of what the SG is all about, nor precisely how it came to be. Examining these gaps in knowledge and trying to fill them is extremely important for addressing the constraints to the SG's accountability or effectiveness. This chapter lays out the history of SG in the US illustrating links between that history and the role of extension work in

[36]For the purpose of this thesis, conservation, environmental protection and environmental stewardship will be referring to environmental stewardship and all of these concepts will be used interchangeably through the thesis.

[37] Puerto Rico as it is closely tied to the US a developed countries can also represent developed countries flows of knowledge.

general in the program today. I describe the history of SG as related to the decades of the 1960s and 1970s, when both modern technology and the US environmental movement were influencing attitudes toward nature, urgent claims about environmental disasters and how to conceive and use a broad natural resource management model, like SG. The chapter closes with the benefits of participating of the Sea Grant Network. The history of Sea Grant and its links to US environmental history, lays the groundwork for chapter three, where I will describe today's Sea Grant program in Puerto Rico. Chapter two and three set the stage for the stars of this study, the marine extension agents, and those with whom they work, featured in chapter four.

The Difficulties of Defining Sea Grant

> **Interviewer-**how would you describe what is Sea Grant?
> **Interviewee-** that's a good question (laugh) I do not know what is SG…
> I do not know what Sea Grant is but at least that is what I think it is [after he gave a definition]
> Interview transcript 012.[38]

> Sea Grant is an innovative program…I believe that it is an initiative that the government must have started based on the Sea Grant objectives…we [Puerto Ricans] do not pay attention to the sea. Sea Grant achieves the goals of educating, advising about the importance and wise use of the marine resources. Therefore, it is a crucial program here in the island.
> Interview transcript 014.[39]

Many of the respondents during the pilot and oral history in this study answered similarly to the question mentioned above. As both of these quotes show, respondents

[38] A local Community Leader in the 1990s who worked closely with the Puerto Rico Sea Grant in the west side of Puerto Rico. Today she is a member of a non-profit and non-governmental environmental group that promotes empowerment of communities and environmental stewardship and does not work with Sea Grant.
[39] One of first PhD degrees conferred by the UPR system in PR and he worked in one of the components of the new extension program in Puerto Rico Sea Grant since 1990s for over seven years. He has dedicated most of the professional life to the promotion of marine literacy and education among teachers and non-scientists. A major contribution while in SG was to work in the development of much needed curricular materials on marine topics for the pre-college level and its integration in the PR regular educational curriculum. Today he is not in the Puerto Rico program but continues to work in environment related issues in the island.

struggled to define and understand SG. Some of the respondents thought their opinion about SG definition was clear at first, but when they were asked to explain in detail their views, they were confused about how to define and what to say about the program. The respondents typically answered that SG is a comprehensive program and that if they mentioned one aspect, another crucial aspect was going to be left out. Others responded more frankly and said with no anxiety that they did not know the true definition of Sea Grant. Having to define a program that has multiple goals and strategies always present the same problem, which is the anxiety that most respondents felt when I asked the question of what Sea Grant is. It is not only hard for current SG staff and public to respond clearly about their definition of a program like SG; in fact SG has an atypical nature that creates confusion since its origin to its structure to various groups: inside natural resource management, the US federal government and funding distribution and each part of the Sea Grant Network particularly each of the 32 College programs inside their university partnerships.[40]

The pioneer Land Grant College Program was a university-partnership offered by US Congress for the utilization of land. This Land Grant, born in 1862, established a crucial precedent for SG. Athelsan Spilhaus, the first scientist who suggested the creation of a program similar to the US Land Grant Act of 1862 presented his idea of "Sea Grant" for marine resource conservation:[41]

> I have suggested the establishment of the 'sea grant colleges' in existing universities to develop oceanic work …These would be modernized parallels of the great developments in agriculture…which were occasioned

[40] This confusion about Sea Grant model and positioning has been true since its origin in the end of 1960s until the present and there are a number of examples to support this out of the ordinary place –this is beyond the scope of this study

[41] Athelstan Spilhaus was born in November 25, 1911 in Capetown, South Africa and he received US citizenship in 1946 after a series of remarkable discoveries.

> by the Land Grant Act of about a hundred years ago…Establishment of the land grant colleges was one of the best investments this nation ever made. The same kind of imagination and foresight should be applied to exploitation of the sea (National Sea Grant 2 2004).[42]

Spilhaus' Sea Grant idea was important because he crafted a different act and program than the original Land Grant. Moreover, a different environmental and political scenario in the 1970s enabled SG to have multiple and different missions and strategies to achieve environmental stewardship on marine and coastal resources. During the 1960s and 1970s, the scenario consisted of multiple historical events like the US environmental movement, more funding in general directed to research (at university, government and private funding levels), the birth of environmental regulatory agencies, and the sea as, increasingly, a primary natural resource in which not only US but the world governments and the global economy were placing their hopes for growth and sustainability.

During the period from 1950s to 1960s, a movement away from agricultural development was evident, which had been the US national focus a century before and a move toward a greater focus on the ocean and coastal resources; this change of attention from land to sea facilitated the establishment of SG. In 1963, Senator Clairbone Pell from Rhode Island introduced legislation to create Sea Grant Colleges by amending the National Science Foundation Act of 1950. The National Sea Grant Act, which conferred the SG program and its legislation, was signed finally in 1966 (National Sea Grant, 2004).

[42]This quote from Spilhaus, comes from his remarks in 1964 at the 93rd meeting of American Fisheries Society (National Sea Grant Office 2004).

Environment in the Public Eye

> The history of the environmental policy process has been associated with state-level politics, where the tendency has been for policymakers, more often than not, to support economic development over environmental quality (Warren 2003)

The twentieth century presented an era where humans continued to engage "in activities that have increasingly threatened the health of the environment (Warren 2003:1)." As Louis Warren explains much of the US economic prosperity began with a high-price on nature (e.g., lost wilderness, with ever-increasing air, land, and water pollution).[43] This section offers a brief history of the US environmental politics, including the rise of new federal-level environmental agencies in 1970s, right about the time when SG was born in 1969.

> On July 2 1970, President Richard Nixon notified the Congress that he planned to reorganize the executive branch to create two new independent agencies: National Oceanic and Atmospheric Administration (NOAA) and Environmental Protection Agency (EPA). Months of increasing public concern about the declining quality of the American environment preceded President Nixon's notice.
>
> …The country's pollution problems were widespread, growing and uncontrolled. …Environment enforcement, as limited as it was, had been the exclusive preserve of the state and local governments…
>
> EPA began its enforcement push at a time when many basic pollution control standards and requirements had not yet been set (Mintz 1995)

For the first time and increasingly at the center of government, the decades of 1960s and 1970s in the United States had environment under widespread public scrutiny. A number of major events were happening at the time in the US that was relevant to the development of marine extension agent roles today. Rachel Carson (1962) published her

[43] Dr. Louise Warren is currently a faculty at the History Department at the University of California at Davis.

book titled *Silent Spring* chronicling environmental disasters that had occurred in the US mainland, in particular with respect to pesticides that had spread throughout the ecological systems that provided food, water, and beauty to many Americans, and for example silenced many bird species. Her work provided a catalyst for US popular opinion to demand new US environmental safeguards and policies that gave the rise to new federal agencies. It is at this time that EPA and NOAA became the prime two federal agencies holding the responsibility to monitor, conserve and protect the US environment. At a very critical position and with much at stake in the 1970s, under the Nixon and Carter administrations, these two federal agencies developed their first steps during their formative years in 1970s and 1980s. They began recruiting new personnel, established their autonomy and networked with state and local level agencies (Mintz 1995).[44]

At the same time, the US Congress enacted new and major environmental legislation. The US government did not act in a vacuum; "public attitudes [were] major considerations for government officials in the process of policymaking" (Warren 2003:55). For more than 30 years, the US public has been concerned with the environment. Rachel Carson, and many who worked with her or in her wake, by the early 1960s showed that not only is environment important to the public, but public health and environmental problems are clearly linked.[45] By the 1970s, environment was clearly an issue of major concern to many in the US and evidenced by the tremendous response to the first Earth Day in April, 1970 (Warren 2003:58).

[44]New major environmental legislations included Clean Air Act, Federal Water Pollution Control Act (FWPCA) of 1972, National Pollutant Discharge Elimination System (NPDES), Ocean Dumping Act that include Marine Protection, Research and Sanctuaries Act, Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

[45]A subsequent section on this chapter will describe the history of the US environmental movement.

One of the consequences of more recent erosions of the importance of environment in the minds of US citizens is that the "[t]he federal environmental regulatory structure…erected in 1970s and extended in 1980s…in the 1990s witnessed diminished enthusiasm,…sometimes hostility, of national policymakers for new federal environmental legislation (Warren 2003:24). The history between local, state and federal levels has always raised tensions (though with substantial variation) was increasingly causing paralysis.[46]

As a result of this late, and almost concurrent, development for environmental agencies and policies in the US during the decades of 1980s and 1990s, it is appropriate to see the early stages of marine extension but also its advancement as recent history. It is thus adequate to assume that many of the Sea Grant marine agents, as described in this oral history, developed their skills and chose their jobs during the 1980s, when environmental protection processes were still expanding, but also beginning to be challenged, or simply losing in the competition with other issues in the public interest.[47] This argument accounts in part for the unstable nature of the atmosphere where these agents were located, trained and expected to take part in SG structure and follow US local, state and federal environmental politics to help stakeholders and information transfer to happen.[48] Amidst this convoluted rapid changing scenario, Sea Grant agents were forced to overcome both political tensions among various levels of political

[46]As Warren (2003) describes: "But state environmental initiatives remain uneven: some states take the lead and follow best practices, others lag behind, unwilling or unable to undertake innovative action to protect environment. This substantial variation in effort and performance among the states is also evident in the trust and involvement in federal-state level relationships."

[47] The 1980s-2000 are the decades that are under examination in this study.

[48]Information transfer and helping stakeholders are Sea Grant core goals. Also the words user-groups, stakeholders, and clientele are use interchangeably throughout the thesis to refer to the public or coastal stakeholders.

agencies and their constituents, also fundamental tensions within the mandate of SG itself –where being a non-advocate is at its core- and achieve their multitask job.

The Politics of Knowledge Production In and Out of the University

> …the university has survived for nearly a millennium by creating new roles and adapting its mix of roles to fundamental changes in the nature of society and its practical needs. Society is changing in radical ways again and we in the university are in a mode of adaptation that appears to be creating deeper involvement in society's efforts to resolve its practical problems. Today's evolving "outreach university" had its origin in a unique 19th century [US] educational innovation, the land grant college. The land grant tradition introduced "service to society" as a function of [the] US higher education. However, we still have difficulty defining and agreeing on what outreach, extension or service should involve as a legitimate university function (Lerner and Simon 1998)[49]

There are three ideas behind the Land Grant System as James T. Bonnen described in his research.[50] First, the Land Grant System of Colleges was not born as a coherent idea or set of institutions or agencies in one decade or even in one generation of leadership. It evolved as an idea, then as an institution and thus as a national system over many decades between 1850s and 1920s. Second, the Land-Grant idea was not conceived solely for the purpose of improving agriculture. Nor it is merely about providing access to higher education for those with limited resources, though this third idea was crucial to its inception. It is about the history of several these pieces: not just good science or merely applied science to solve practical and current problems in society, but a long process that unfolds through extension based. This process uses education as a tool to

[49] Richard Lerner and Dr. Lou Anna K. Simon are cited in James T. Bonnen work (see next footnote on Bonnen Land Grant research work). Richard Lerner is a faculty member at Child Human Development at Tufts University and Dr. Lou Anna K. Simon is the current president at the Michigan State University –a well-known Land Grant and extension institution. Both Lerner and Simon have done work related to the university extension, outreach and social responsibility role and its connection and history to Land Grant.

[50] Dr. James T. Bonnen, professor emeritus of agricultural economics at Michigan State University, and author of "Land Grant Universities Are Changing" and "The Land Grant Idea and the Evolving Outreach University." Retrieved December 5, 2005 on http://www.adec.edu/clemson/program5.html

help people to find practical problem solutions integrating these practical solutions into a larger conversation of broader social debates --where values and the various types of knowledge are placed. Ultimately, the land grant has been a changing idea; *it is a set of changing beliefs about how to develop the social role of the university* (Bonnen 1998).

In fact Justin Morrill, the congressional legislator who sponsored the act establishing the Land-Grant university system, was primarily concerned with broader, more democratic access to higher education in order to strengthen democracy:

> Historically, the university has been a primary knowledge center of society. However, as society becomes more dependent upon scientific knowledge for its continued growth and vitality, its focus on knowledge shifts in emphasis from the conservation, retrieval, and communication of existing knowledge to place in a strategic role the process be which knowledge is created and moved into productive use. The capacity for creating and transmitting knowledge has made the university even more important to society as society becomes progressively more dependent on the creation of new knowledge for continued growth. At the same time other institutions have developed, which now complement or compete with the university. The university no longer has, if it ever did, a monopoly on the creation of scientific and scholarly knowledge (Bonnen 1998).

The university and many other institutions in our contemporary world produce various types of knowledge, but universities are among the most trusted and acknowledged sites for producing scientific knowledge. By the end of 1960s and 1970s the university had to develop a social responsibility role and needed to account for their actions at many levels (e.g., social, political, economical, culturally). This new social responsibility university role offered an open door for the validation of other types of knowledge other than science. The subject of the politics of knowledge is particularly relevant for this study because marine agents are located within a university system

where basic scientific knowledge is highly praised, yet agents must deal in their day-to-day job with many types of more vernacular knowledge. An agent's aim is often to harmonize --or at least recognize-- these distinct types of knowledge in our contemporary world. This harmonization, or at least the recognition, is a demanding and unpopular task when, as some scholars have noted, much about today's world tends toward to subjugation of certain knowledge forms and the veneration or elevation of others.[51] Other concepts that become relevant to the politics of knowledge are the audit cultures and the accountability and efficiency regimes that also developed during the 1980s and 2000 (Strathern 2000; Brenneis 1998). The combination of these pressures in the transformation of jobs, the economy and the evaluation of added value to particular forms of knowledge influence the way in which the changing position of extension agent is positioned.

The role of science, especially in the wake of World War II as it was used to rebuild entire regions, transformed the politics of knowledge. I will discuss briefly the role of science in Latin American and the Caribbean region, and its application to Puerto Rico, for there it has had different meanings than for example in the mainland US or western Europe. In the World Science Report 2002, Ana Maria Cetto and Hebe Vessuri explained, "…the low level activity of Latin American [and the Caribbean] region and the existence of a greater potential for participation [in science and technology],…shall indicate…areas…to represent advantages and threats…(Cetto and Hebe 2002:1)." Cetto

[51] Foucault defines "subjugated knowledges" as "a whole set of knowledges that have been disqualified as inadequate to their task or insufficiently elaborated: naive knowledges, located low down on the hierarchy, beneath the required level of cognition or scientificity." He notes further that" ...I also believe that it is through the re-emergence of these...knowledges...and which involve what I would call a popular knowledge...a particular, local, regional knowledge, a differential knowledge incapable of unanimity and which owes its force only to the harshness with which it is opposed by everything surrounding it...that criticism performs its work." (Gordon 1980:82)

and Vessuri have been working for a number of years in the 1990s with United Nations Educational, Scientific and Cultural Organization (UNESCO) on the role of science in Latin American and the Caribbean region (LAC). They reported a list of conditions and challenges that this region had related to the role and practice of science. Since this topic it is only signaled in this thesis, I will mention only several conditions and challenges that I see affecting the work lives of marine extension agents in Puerto Rico.

Their 2002 UNESCO report, a section titled *Emigrant networks* had an important observation on the role of science inside the LAC region: "The greatest difficulty seems to prevent emigration itself [from LAC scientists], since this would require a substantial improvement of the working conditions for scientists in their countries [of origin] to lessen the lure of the countries of the North."[52] This observation suggests that there are abundant barriers for LAC scientists to actually practice within their region, resulting in a phenomenon widely called *brain drain* or the emigration of local qualified scientists. This means perpetual loss of valuable knowledge and expertise to the LAC countries since these local qualified scientists leave to study or practice elsewhere. Unfortunately, in general there is no precise data available on this phenomenon and although Puerto Rico is not included in these observations, these remarks are true at some level, especially considering specific fields like engineering, science and research largely to countries like the US based on Puerto Rico's US relationship. Puerto Rican marine agents in this study are considered to be scientists as their job responsibilities and requirements can be as demanding and research oriented as scientists or any researcher or tenure track faculty in

[52] This 2002 UNESCO report did not include Puerto Rico, but did mention that there are some conditions that can affect the position of certain regions under study and Puerto Rico is part of the Latin American and Caribbean region on various aspects: "The authors use the term Countries of the North to refer to developed countries like United States, Europe and Asia that may provide better opportunities in someone's career, salary and ability to develop and grow over time" (Cetto and Vessuri 2002:16).

Puerto Rico or the US and their capacity and ability to work with various types of knowledge like science, folk and cultural knowledge. Puerto Rico Sea Grant agents are working under similar conditions to the above-mentioned ones, and yet with heavily regionally and locally specific mandates on top of the US national priorities.

Furthermore, in developing countries like the US, there is a high demand for highly specialized scientists and there is the adoption of programs and policies to attract highly qualified migrants (Cetto and Hebe 2002:17). "The US in particular…hails as a success the fact that almost 50% of foreign students who graduated in science and engineering stays in 1990/1 were still living in the US five years later (Cetto and Hebe 2002:16)."

In a *Nature* 1999 supplement about Science in Latin American, some LAC scientists indicated, "two problems that come up again and again: lack of resources and slow access to material (Macilwain 1999:4)." Another five problems that must be confronted by these LAC qualified scientists "in ascending order of difficulty [were]: reluctance to accept outside peer review, the lack of regional integration in science, the scientists grudging acceptance of the free market, the pressing need for university reform, and a failure to acknowledge the importance of intellectual rights property rights in modern science (Cetto and Hebe 2002:4)." Today the LAC "international scientific scene offers a highly complex picture and the…region appears to be both economically and politically unstable, which weakens [their global authority and] bargaining power (Cetto and Hebe 2002:30)."[53] A demanding LAC environment and the attractive invitation from

[53] Some of the conditions that the international scientific scene offers are: "…economic adjustments demanded by the International Monetary Fund (IMF); pressure to …licenses and intellectual property problems…; efforts to control drug trafficking; production of weapons…and terrorism (Cetto and Hebe 2002:30).

countries of the North creates a challenging decision to LAC qualified scientists about whether to stay in their countries of origin or even within the region.

Nevertheless, LAC presents countless assets that offer a special and positive role and practice of science. For example, the universities in LAC have been in contact with the international community in relation to the role and practice of science (Cetto and Hebe 2002:9). In fact, although having major barriers, the region offers incalculable and competitive human resources and the ability to integrate groups with different languages that even other 'developed' countries may not have as a commonality.

Some related topics to the politics of knowledge that must be signaled here are issues of modernity and, in this particular case, of colonialism that in fact affect both the Sea Grant and the Puerto Rico Sea Grant programs.[54] "During the renaissance of the 17th and 18th centuries, modernity was again re-invented to characterize science, rationalism and the pursuit of 'progress' --meanings that will still have considerable currency and validity at the end of 20th century (Arce and Long 2000:2)." Furthermore, Arce and Long describe that,

> …the emulation of 'civilisation' (or modernity) over designated 'barbarism' constituted the construction of 'time' (modern) which simultaneously posited the so-called 'backward' or 'underdeveloped' countries (later exalted as Third World) as representing an earlier stage of technological inferiority and ignorance (due principally to their lack of scientific knowledge and modern legal-rational institutions)
> (Arce and Long 2000:5)

The mid-1900s, as we have mentioned above regarding the role of science in post war reconstruction efforts, was an era of a rising new 'modern' world. It is no coincidence that this is also the era of Land Grant expansion into extension work: by the

[54] This work will only signal several topics such as modernity and colonialism. The essay will not go in-depth on any of them here. However, it is relevant to mention them for further work is underway and indeed is needed on these themes, as they influence environmental outcomes today.

end of 1940s to 1960s when Land Grant began to value extension for doing a better job. It took almost 100 years for the Land Grant program to recognize the importance of extension service. Conversely, the SG began in the 1970s already having extension as part of their core mission and during the 1960s is when Spilhaus presented his idea of "Sea Grant" for marine resource conservation.[55] It is under this 'modern view' that a new value of transferring knowledge to masses became crucial and pertinent --almost this came to be the mission for extension edification and inclusion in that rising world. For example, during the mid-1900s if you were a poor farmer in the US, in that sometimes patronizing notions situation where the modern versus the 'uncivilized' notions determined the new meanings within that changing society and it might have affected you as a farmer deeply. In Puerto Rico, however, another pertinent layer of history was important as well: the colonial layer (which I will discuss further on chapter three).

From Silent Spring to Sustainability: Environmental Movements and Management

> …we have allowed these chemicals to be used with little or no advance investigation of their effect on soil, water, wildlife, and [hu]man himself. Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world that supports all life.
>
> There is still very limited awareness of the nature of the threat. This is an era of specialists, each of whom sees his own problem and is unaware of or intolerant of the larger frame into which it fits. It is also an era dominated by industry, in which the right to make a dollar at whatever cost is seldom challenged. We urgently need an end to these false assurances…It is the public that is being asked to assume the risks that the insect controllers calculate. The public must decide whether it wishes to continue on the present road and it can only do so in full possession of the facts (Carson 1962:13)

[55] See earlier section on *The Difficulties of Defining Sea Grant* in this chapter for details.

Rachel Carson is one of the most well-known figures working in environment during the 1960s in the US national context. Carson was very clear on her book Silent Spring on the fatal impacts that our society has constantly 'done and pressured' on our natural resources capacity. This is a powerful quote from her book where she is not only presenting evidence and the pressing issues. Carson is giving a recommendation on how to face the detrimental situation: informing the public; so the public has a more active role part and have the option of doing something to stop the current practices on the use and overuse of the natural resources. Such a powerful analysis on environmental deterioration made her a key figure not only in environment but in general within the US society.

Warren (2003) suggests a "convenient way to distinguish between an earlier [US] conservationist…[with] national parks, forest lands, resource development and recreational resources and today's [US] environmental era where pollution and environmental hazards dominate contemporary policy agendas. (Warren 2003:245)." However, the environmental movement cannot be reduced to this abrupt divide. The US environmental movement is a complex movement that rose over diverse roots. There were various key figures that can lay out the foundations of this movement; three of them will be discussed in this section to further explain the history of environment in the US, SG marine extension and natural resource management: Bob Marshall, Alice Hamilton, and Rachel Carson.[56]

[56] Dr. Louise Warren in his Chapter 9-Something in the Wind: Radiation, Pesticides, and Air Pollution from on his book titled American Environmental History described these three figures as key players as someone who has done work in the US environmental history. Using these three figures is a concise way of

These three figures are signaling a very complex US environmental movement that has many voices and many interests. "[These] figures …transcended the limited discourse of the era [before 1960s], forcing their contemporaries to realize that much more is at stake than one damaged forest or one industrial poison or one dying bird (Warren 2003:254)." For example, Marshall's life mission, one which he actively pursued from the turn of the century through the 1940's, was in fact "to link social justice and [the] protected wilderness (Warren 2003:249)." Alice Hamilton, on the other hand, was born in 1869 during the industrial revolution time, and situated on an environmental hazard in urban and industrial life context. Alice Hamilton was influential toward the 1910s-1940s when she became the premier investigator of occupational hazards in the US and she became the "the country's most effective voice for exploring the environmental consequences of industrial activity (Warren 2003:250-51)."[57] Carson, far more recognized than either Marshall or Hamilton today, presented "a link between urban and industrial issues with fear of the degradation of the natural environment (Warren 2003:251). The above excerpts from Carson's *Silent Spring* show that by 1960s the natural environment was increasingly understood by her within the US as "under siege from a science and a technology that in her words 'had armed with the most modern and terrible weapons'…(Warren 2003:253)."

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presenting historical groundwork for how marine extension is shaping before and when Sea Grant was born.

[57] Hamilton studied "a field that had largely failed to elicit interest in academy, industry or government circles. In 1919 she was appointed assistant professor of industrial medicine in Harvard University…The appointment attracted attention since she was the first woman professor in any field at Harvard and the university did not admit women in its medical school. But Hamilton was partly chosen because there weren't any men interested in the position and the medical field and academic world… viewed occupational and environmental issues with little interest (Warren 2003:251)."

Two major factors created the receptivity needed from US general public for the points of Carson and many 'unrecognized' colleagues, like Hamilton and Marshall, who claimed similar arguments: the increasing amount of recreational time and greater discretionary salaries available to many, and the first Earth Day celebration. These conditions allowed for the first time that the US citizens "had the opportunity to enjoy the outdoors as never before" (Warren 2003:274), and felt more militant about protecting it. Other contextual simultaneous factors that also had major impact on the change of US general public in the 1960s and 1970s vision of environment were: a boom in the automobile industry, the US population, road-system expansion and the suburb development. Each of these developments threatened natural resources in a much rapid and 'careless' manner than in previous times. For example, the growth of the automobile industry allowed each family to own at least two cars and in combination with the Highway Act of 1956 made the 'retreats with nature' more accessible for everyone. However, cars and highways are not 'environmental friendly' in their primary purpose, these two factors were not isolated, and there was also the development of suburbs that even today still represent latent threats to not only the US but global environment.[58] "During the 1950s, [US] suburbs grew six times faster than established cities…(Warren 2003:274)." The US post-war scenario produced: intensive use of the land, air and water pollution, waste dumping, increased heavy industries waste (e.g. electricity and other for

[58] This statement signals how these processes have not stop being present even in our contemporary society. In fact, our modern or the world within the last 50 years or last century is embedded into a capitalist system that highly praise the market-oriented economy fueling the need and the satisfaction the increased demand and its effect on environment and the capacity and 'deteriorated state' of the natural resources left across the world is true beyond the US context. This is large scale and in part the aspect that makes this statement so urgent to examine because it is not only the various factors but the scope and scale of the same 'consuming patterns and cultures' all over the world.

the construction of suburbs). It is not until the end of 1970s when the timing for a popular protest asked for adequate reform.

After publishing *Silent Spring*,

> Carson continued to counter her critics by elaborating key elements of her argument: that science and specialized technical knowledge has been divorced from any larger policy framework or public input; that 'science' could be purchased and thus corrupted; that the rise of pesticides was an indicative of 'an era dominated by industry, in which the right to make money, at whatever cost to others, is seldom challenged'; and that the pesticide problem revealed how hazardous technologies could pollute both natural and human environments. (Warren 2003:253)

A final relevant factor and some researchers may argue that the first event of the US environmental movement is the first major public protest, the Earth Day in 1970. It had an estimated number of 20 million participants and ten thousands schools and 2,000 colleges and universities (Warren 2003:273). All sectors of US public were acting together: "…all increasingly galvanized the young into a potential cultural force," pushing tremendous growth in environmental organizations. For the first time, grass-roots groups were united, advocacy and activism were building the roots of the US environmental movement, for which was born some time after the decades of the 1960s and 1970s (Warren 2003:276)."[59]

On the Benefits of Being "Sea Grant"

The issues sketched in the previous sections have greatly influenced the passionate motivations and deep challenges of today's conservation and environmental management professionals. This section views the work of these professionals through

[59] By no means is the US environmental movement perfect; the movement "came under fire for not being inclusive enough defending the recreational landscapes of white, middle and upper class people at the expense of [US's] minority-dominated inner cities and the rural and urban workplaces of blue-collar people. In recent years, the critique to environmentalism had inspired calls for environmental justice…"

slightly more detailed lens: that of the Sea Grant Network and the roles of specific programs, projects and professionals within it. It focuses on three of the major benefits of the Sea Grant Network participating institutions and actors and how becoming part of this program makes a difference: **extension as a core aspiration** linking groups with one another locally, **autonomy** for local Sea Grant offices vis a vis their regional partners, and **integration to a massive system**, the Sea Grant Network. In sum, Sea Grant is a federal-university partner with a wealth of participants such as NOAA, US Department of Commerce, coastal US states, industry, around 300 partner institutions, federal funding, the National Sea Grant Review panel, Sea Grant Association, among others.[60]

Unlike the Land Grant which over time developed the third arm of extension, Sea Grant since its origin had **extension as its core aspiration.** Placing extension at the heart of this program have created that it has a different role and importance on Sea Grant development. Therefore, the Sea Grant Network and each of the local offices and anyone who works at SG has some understanding and see the connection of extension not only to coastal and marine resource management but to education and research as a natural connection. This connection of extension to other strategies is not a typical and 'used' approach even today, in a world that highly praise research and specialized knowledge over other types of knowledge and methodologies for studying human interactions and pressing issues.

"Each [SG program] has internal dynamics and different relations to their stakeholders."[61] The National office gives no prescribed administration model for each College program to follow, nor does it require each Sea Grant College Program to have a

[60] James Murray, PhD-Former Extension Director at the National Office presented this as his definition for Sea Grant on his presentation in 2004.
[61] Interview notes 001

particular organizational arrangement at their local office. Each college program has its own set of offices and relationships to other agencies such as the Cooperative Extension Service (CES), Department of Natural Resources (DNR), and the Environmental Quality Board. In addition, some local, state, or county offices might also offer training to Sea Grant marine extension agents. Other operations, such as funding, administration, recruitment, training, and the development of extension and educational components, are also designed and run internally.[62] In this sense, each college program is autonomous and separated from the National program.[63]

The establishment of levels inside the SG determines when an academic institution can become a "College" program –the fourth and most important level to become autonomous, which is a critical aspect to the foundation of SG. This autonomy and its positioning at the **local versus national levels and combined with a bottom up structure** establish a different outlook on how to use and stretch the role and the goals of extension inside this comprehensive model. In order to become a Sea Grant College program, a university advances through four different status levels. Each level represents

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[62] As for allocating funds attained, a national mandate recommends that 50% of funds be directed toward research and the other 50% toward education and extension. The maximum program in 2002 earned $6,553,090 in funding divided into Sea Grant, "passthru" and matching funds; this was the California Sea Grant Program. It received $4,386,388 from the Sea Grant, $1,207,050 from passthru and $1,378,372 from matching funds. The program that received the least funding was $431,408. This program was located in Vermont. It received $216,000 from Sea Grant, none from pasthru and $215,408 from matching funds. Puerto Rico received $1,800,619 in 2002. It received $982,560 from Sea Grant, $50,000 from passthru, and $768,059 from matching funds. Puerto Rico's total funding is located in position number 27 out of 32 programs. The funding of Sea Grant programs altogether amount to a total of $102,550,506 (NSGO Biennial Report 2002-2003 2004).

[63] Sea Grant's level of investment is divided into four areas: research, administration, education and outreach. An investment summary of the years 1999-2003 indicates that research received the highest amount of funding from these four areas with $111,963,948 out of $209,509,113. The second area, administration, received $17,379, following education with $12,923,109 and outreach with $67,243,113 (NSGO Biennial Report 2002-2003 2004).

a higher amount of funding and responsibility within the Sea Grant Network.[64] The first level is that of Marine Advisory Project. Sea Grant provides "project support" for individual research efforts in marine resource development at colleges and universities across the country. The second status is that of coherent program and the third level is that of institutional program. Finally, the highest and most autonomous level is that of College program. A program attains College status when it has matched half of the funding coming from the National office and has been developed an organizational size and structure that allows it to act as an autonomous entity.

Figure 3 ***Sea Grant position inside NOAA and DOC***

Another major benefit is the **link to a massive network** when a program joins SG (see figure 3 above). The program joins a national network of professionals who pursue

[64] As the program achieves a higher status, less funding from the National office is expected and corresponding matching funds need to be procured from outside. Matching funds are those that come from organizations, government, county, or any other funding source which is not the Congress or the federal government through NOAA.

in theory and in practice at some extent the same vision, ideals, expectations and achieve similar ends. The national status and the capacity of a network of professionals in the same area provide a coherent structure of people, experts, and professionals sharing the same job-positions, peer-review, evaluations, and credible sources of scientific information.

Sea Grant's interconnected network stimulates people, actions, participation, discussion and decision-making processes. Having both national and local-level staff and administration enhances the production of public policy and participatory management of coastal and natural resources. Sea Grant as an environmental program aims to study, research, assess the needs of stakeholders and establish dialogue and negotiation to make the best *possible* decisions. Sea Grant has a comprehensive approach that involves cohesive effort from all segments involved. All these approaches place SG at a new level within coastal and environmental management, academia, the government, and in our contemporary society where the "public" is becoming increasingly link to private sectors, science and industry.

Extending Extension Work: Beyond History into Current Challenges

From 1914 to the present, extension work in general has been transformed. Environmental stewardship agencies, as they grew, recognized the importance of extension and gradually added relevant programs: an agricultural extension program came to the Department of Agriculture and to the experimental stations in the beginning of 1900. In addition, many universities added and supported extension training in the US within their academic programs by mid-1900s, more so in the end of this century. As a

result, a new area in extension could be developed by the 1960s: for the coastal and marine resources. This became the backbone of the newly formed SG. The following part of the section examines the working definitions of extension within the SG vision and its internal structure at the national SG level.

The National Sea Grant Extension (NSGE) or Marine Outreach Program (MOP) or Marine Advisory Services (MAS), as it has been variously known, is one of the three key components (e.g., extension, education, and research) in the Sea Grant program.[65] The NSGE is composed of all the Sea Grant College extension programs.[66] Each local College extension program has many forms and shapes. Typically, the extension programs are university-based educational programs seeking to apply scientific knowledge gained through research to aid individuals and user groups of marine resources to learn and to make decisions.

Extension work takes many forms. A Sea Grant marine extension agent can be known as a specialist, educator, marine advisor, professor, or agent. The overall goal of extension in the Sea Grant program is to inform the decision-making process at all levels, from individual to public policy. SG extension has two major objectives: to transfer scientific information and to serve as a multi-direction or two-way channel of

[65] The National Office as any other local Sea Grant has funding but also has the task of managing the entire Sea Grant Network US Congress annual funding. Funding is appropriated from US Congress to NOAA-National Sea Grant Office. The US Federal money is matched (2:1) and leveraged. Each program calls for proposals addressing state needs and proposals are peer-reviewed and competitively selected. In FY 03 Sea Grant awarded 143 grants. Programs receive 58% of support from NOAA. Other funding sources include private sources, state and local governments, industry, other federal agencies (NSGO managed). This information was taken from a 2004 National Institute of Health presentation by Jim Murray-Former Director of Outreach at the National Sea Grant Office.

[66] The Sea Grant Outreach Community consists of: 25 Marine Education specialists, 300 Extension staff/specialists and 70 Communications specialists across the nation. This information was taken from a 2004 National Institute of Health presentation by Jim Murray-Former Director of Outreach at the National Sea Grant Office.

communication among user groups or stakeholders. Extension conducts educational activities that affect behavioral or economic change through local involvement focused on outcome-based products.

As it is defined in the most recent extension handbook by the National Sea Grant Office titled ***Fundamentals of a Sea Grant Extension Program***(2001), extension work entails *designing activities* that effect *behavior* change through constituent-driven programs focused on *outcome-based objectives* using a variety of educational processes and techniques over a *continuum of time* (National Sea Grant 2001:8). The role of the marine extension agent is characterized by several fundamental aspects that link back to the history described above, in particular, the notion of bringing the edification of new knowledge to those otherwise outside its reach, in order to change or improve them at the level of their knowledge base, but also their behavior. This notion, embedded in the very history of the term (in French, the word is "vulgarisateur" or ones who takes knowledge to the vulgar or common people). Such chains of information transfer and behavior transformation are linked to the history and politics of at least a century ago, or more, but still inform the formal definition of extension work--at least in theory (subsequent chapters will explore further how extension work is practiced).

And yet, my research reveals that the conceptualization of extension work by Sea Grant is not actually so flat. What makes extension so special and interesting is how extension acts at the intersection of multiple areas, issues, people and problems; extension does not happen in isolation. Extension agents must be professional, expert, and sociable people, who are able to interact with stakeholders or clientele as varied as the governor, regulatory agencies, coastal communities, and non-profits, among others.

Taken from the Sea Grant extension literature review, the three major activities used for extension programming are: planning, collaboration, and relationship to research. Planning an extension program begins with a corresponding project's mission with the three core goals taken from the National office and NOAA strategic plans. Also planning occurs at a local level, in which the local SG office sets broad goals to identify their priorities, extension program development and how it connects to local and regional needs. If this planning stage is difficult the extension program can receive help from advisory committees to set goals. Most extension professionals, as they are named, use a citizen advisory group to help plan activities and provide overall direction. Contrary to the history of extension work as a "top-down" affair, a "bottom-up" or grass-roots approach to programming distinguishes the extension education practices of the present. For instance, the Cooperative Extension Services (CES), a US organization that promotes extension work on various subject areas, continues to provide useful scientific information today.[67]

One form of extension work is currently referred to as outreach. Historically, outreach was the first term used back in the 1970s to refer to extension work. By the end of the 1990s and today, extension educator or educators are the more common terms used to describe the agent. Taken from the first Sea Grant extension handbook (1978) outreach refers more specifically to transfer and dissemination of information (Panshin and

[67] *Cooperative Extension System (national system) and Cooperative Extension Service (state partner)* is a national system is a unique organizational structure consisting of the federal partner (ES-USDA), state partners (extension services, units of land-grant colleges and universities), and local partners of city/county governments. Another way to refer to CES is only by *extension* the third partner in the land-grant system created by the Smith-Lever Act of 1914 (Graham 1994).

Wilkins 1978). It can be defined as those activities that extend coastal and marine information to user groups. The most important outreach activity is to connect agents with user-groups and it implies that the agent assesses the needs of the users and takes those needs back to the program to develop applied research. Then, outreach allows for a two-way channel of communications between agents and their user groups.

Extension educators act as agents of change with the freedom to develop programs that are based on the needs and expressed desires of the people. These extension programs can evolve in part through their application to broader contemporary issues. The flexibility of the CES organism allows for change in the organizational structure as well as allows agents to focus on emerging issues that influence the citizens' quality of life. This flexibility and continual needs assessment keeps the CES viable and sustains Smith-Lever's missions, the law that promulgates the CES as well as the Land Grant Act (Graham 1994).

The agent recognizes that extension work is not an isolated event but the combination of a series of events that may take several years to achieve (National Sea Grant 2004:8). An agent assesses the needs of stakeholders but also must provide scientific information. Finally, the resulting extension programming --either through a public hearing, a community meeting, or a talk, must have measurable outcomes to help determine its success. Following these steps, the extension program at least in theory becomes accountable to and a credible source to the general public.

In fact, it is the ability to take on many forms and roles and to become a multi-faceted professional that allows the agent to be the key player within Sea Grant's tri-

partite goals of commerce, research and environmental stewardship; actively mediating the implementation of its three-arm strategies of education, information, and management. Extension serves as the liaison between stakeholders and the Sea Grant program. It is a unique liaison, the study of which is especially important since there are small numbers of environmental programs, or any other institutions, that have similar all-encompassing ideals for education and translation at the intersection of knowledge and behavior. The extension model of the SG program, well monitored and maintained, could be vital to many governmental, private sector and environmental groups.

Extension is linked to research in two ways: finding and disseminating scientific information to stakeholders and evaluating stakeholders' demand to develop applied research. Each SG local extension program is a sum of these three major components and as a result it becomes a credible source of non-advocate and scientific information. SG extension agents follow the devices of: 1)information generated by researchers, 2)delivering scientific information to those who need it and 3)notifying researchers about issues they should be studying (Panshin and Wilkins 1978). From the SG perspective, there is little to do in extension without research. But at the same time, research as described by agents in this study, cannot function efficiently without extension.[68]

In general SG has a different strategy for managing coastal and marine resources than the majority of existing and past environmental programs. SG integrates approaches that have not previously been conceived together, such as education, communication, extension, and research. SG builds a national office with a specific mandate that connects

[68] The Puerto Rico interviews become important because they show that extension is critical to achieve education and research. At some level there is suggestion by these respondents that extension, not research, is the heart of Sea Grant. They describe that extension is the engine as it needs to translate science into spoken language and assess stakeholders' needs; it is a two-way channel the key feature of extension.

it to autonomous college offices located at the universities pursuing similar goals but each university office have their own administration. At the local level, the SG office is located inside a university; this is called *university-partnership.*[69] Both the national office and the university-partnership have some leverage upon the local SG office, because funding and resources come from these two major sources. Nonetheless, the local office can make pertinent and independent decisions to run its own program.

The autonomous local organizations and the level-status management create interaction among the SG university partnerships. Furthermore, the Sea Grant network allows peer-review for funding purposes, provides an external evaluation processes which does not affect the amount of funding given by the national office and consists of a network of other professionals and experts. Sea Grant's network expanded between the end of the 1990s to the present; as a result, my recent history is a challenging one since many of the new techniques used to establish and encourage the network or partnership of this large program were implemented within the last five years. Let us now turn to some of that more recent history in the context of Puerto Rico.

[69]Discussed in detail on chapter four in the section titled *The UPR System: Operations of the University-Partnership for Extension.*

Chapter Three-

Puerto Rico: A Microcosm of Plural Coastal Worlds

> While environmental problems are present throughout the archipelago, including the mountainous inland areas, they are more acute in the coastal zone of Puerto Rico (Valdés-Pizzini 2001:4).

Map from http://www.worldatlas.com/webimage/countrys/namerica/caribb/pr.htm (last accessed August 2005)

Valdés-Pizzini notes that, "In the last ten years, the Puerto Rican government heavily invested in the stimulation of the construction sector, funneling funds into infrastructure projects. It also instituted the policy of 'fast tracking' procedures and permits to allow an increase in the number of projects receiving government approval (Valdés-Pizzini 2001:13)." In the absence of powerful conservation and academic institutions, the commercial or economic interests in Puerto Rico (PR) have had control

over the government/state to expand urban and coastal development, fueling PR's economy. In this sense, the history presented here for PR can be seen as a cautionary tale about broader global processes.[70] Sea Grant is a program for and about Puerto Rico. The excerpt below comes from an interview with a PR native, a marine advisor who obtained an MA in marine sciences in PR and a PhD in the US. This advisor was one of the first extension agents in the beginning of the 1980s, and worked for about three years at the Puerto Rico Sea Grant. The respondent is not currently in the program, however, for the lure of higher salaries in the United States precluded long term work in PR for this person (a problem about which I will have more to say in this thesis):[71]

> I do not see the role of Sea Grant only at the beach; even more in a place like Puerto Rico where we are an island, where if we damage the center part [mountains; land] it will have clear effects on the beach. Therefore, we as an island must change our vision within the National Sea Grant. We need to work with the center part of the island even when there are no beaches there. Sometimes we are in Morovis, Orocovis, Utuado[72]…we have done projects here….workshops about garbage, solid waste and how if you throw garbage in the mountains it will eventually come to the beach and we will see the effects. It is called Sea Grant but it includes technically everything. Interview transcript 010[73]

The Puerto Rico Sea Grant College Program is part of the National Sea Grant Network but beyond this link, the island offers many other characteristics that reflect a microcosm of many of the world's coastal management and marine extension challenges,

[70] Valdes-Pizzini in a recent 2005 working paper titled *The building blocks of coastal conservation in Puerto Rico: development, education, policies and sustainability* summarizes some of the impacts in the island of Puerto Rico relevant to the example of Puerto Rico as a microcosm of the plural coastal worlds: "[the] unplanned growth has been disastrous for critical habitats, causing loss of important agricultural lands in the fertile coastal plains, loss of mangrove forests, transformation of estuaries, destruction of wetlands, contamination of underground aquifers, erosion and sedimentation of watersheds, water reservoirs, and coastal habitats such as sea grass beds and coral reefs."

[71] Interview Transcript 015

[72] Names of 'municipios' or cities located in the center of the island.

[73] Studied a BA in Puerto Rico and joined the Puerto Rico program by mid-1990s working in one of the Sea Grant components related to extension. Currently, she still works in the program.

and therefore an excellent site for study. First, PR presents two major conditions causing the depletion of marine and coastal resources: abundance of marine and coastal resources and rapid urban and coastal development. These are two conditions that will be discussed separately in the following sections in this chapter. Second, PR has specific characteristics that make it relevant to the world as a whole. For example, it has a special relationship to the US, which allows programs like Sea Grant to develop and enables certain forms of North American or US style modernity to unfold there.

Puerto Rico is the easternmost of the Greater Antilles and the fourth largest island in the Caribbean. Not only in terms of its location but in terms of its political and socio-cultural aspects, the island is located at the crossroads of North and South America. It may be part of mainland US modernity, in some ways, but it is also a place where some see the US as a colonizing power, its cultural and geographic connections to both the Caribbean and in Latin America. Puerto Rico shares some of these broader regions' particular promise and challenge for integrating economic development and environmental management. Through its deeply bilingual Spanish/English society, however, it is also uniquely positioned to make such promises real, and to meet such challenges.

Puerto Rico is an island with a unique history and location within Latin America, the Caribbean and the United States it is, as stated in the Strategic Plan for Sea Grant, "simply different." Understanding Puerto Rico Sea Grant history, how it works, and the link to their university-partnership, University of Puerto Rico (UPR), help to understand the conditions that shape the agent's voices, presented for the most part in a subsequent chapter. The chapter three and in general the thesis has lots of information of the

university or research component. Although the university becomes a central part of the thesis by no means is aiming to undervalue the effects of the environmental stewardship and commerce on Sea Grant goals and in the transformation of the marine agents.

Rich Ecology: Puerto Rico's Abundance of Coastal and Marine Resources

PR has an abundance of coastal and marine resources yet to be managed. The PR-US territory comprises 78 municipalities including three small islands and numerous islets in a land that extends 110 miles east to west and 39 miles north to south. Puerto Rico is located at the heart of the sub-tropical climate zone and it contains diverse geological, land, coastal and marine resources. These weather and geographical conditions host a variety of mangroves, forests, land forms, wetlands, beautiful beaches, bodies of waters, coral reefs, animal species, and plants. Sea Grant's mission --to achieve the responsible use and conservation of our marine and coastal resources-- becomes particularly vital in PR because of the country's biological and ecological diversity. Because it is an island with obviously finite resources, PR must often seek rapid solutions to problems in comparison to larger countries.

Photograph shown on next page is of Piñones Mangrove Forest in Loíza, Puerto Rico. This is a mangrove forest located in the northeast side of the island. Photograph taken from a 1999 edition of *Travel & Sports* Magazine.

Luxuriant mangroves at Laguna de Piñones protect the land and provides energy for growth of wildlife. (©Travel & Sports)

The Caribbean can best be described as a series of peaks and summits that vary in size as submerged mountain chains above sea level (Owusu 2004). The geographical closeness and the existence of water passages increase the movements of people, ships, commerce and tourism. Undeniably, geography has played a significant role in this area. Moreover, the Caribbean region possesses diverse ecology, geography and natural resources that are under pressing factors: high population density, rapid urban and coastal development, a reliance upon on the tourism industry for economic growth, a lowland subtropical ecology, the persistent effects of the African slave trade, the plantation system and colonialism, successive massive migrations of new foreign populations, and a high degree of individualization as a preeminent feature of Caribbean social organization. These features altogether may lead to rapid depletion due to its small land mass and limited resources.[74] Puerto Rico, as any other island or small land extension, has extremely limited resources and capacity for development; thus it needs to become aware of this limitation to make the best decisions on how to manage it's coastal and marine resources.

Increasing productivity in Puerto Rico's environment could negatively affect the availability of its resources and the implementation of sustainable development. In the late 1960's and the early 1970's Puerto Rico experienced a major population increase due to natural growth and to the process of return migration from the Frost Belt of the US

[74]Mintz points out there are Caribbean regional commonalities that explain how the topography affects the development of these countries (Mintz 1985). Urban expansion and industrial developments encroached in estuarine zones, along beaches and lagoons; wetlands and swamps drained and filled to make more room for the ever-growing community; beaches and dunes exploited for sand needed for constructing homes, factories, office building, roads and runaways; many rivers and coastal waters were chocked with the sediments of the land disturbances and domestic and industrial waters were all present since 1970s in the island. The marine environment, the prime recipient of the abuse, suffered progressive damage, the full extent of which is still largely unknown (Puerto Rico and the Sea 1974).

(Puerto Rico Sea Grant Strategic Plan 2001:5). Moreover, the changing economies and demographics of PR and the USVI resulted in an increased development and urban growth, particularly in the 1980's. These development processes had a devastating effect on the wetlands and coastal ecosystems of the islands. Furthermore, the demand for seafood products created many problems (e.g., decline of important aquatic species, decline in water quality, etc), mainly due to an unprecedented effort by local small-fishers to satisfy the demand (Puerto Rico Sea Grant Strategic Plan 2001:5).

Coastal and Urban Development: Puerto Rico's Rapid Growth

> Puerto Rico programmatic planning is non-existent and… environmental groups [not the Puerto Rico government] are responsible for trying to preserve and conserve the future of Puerto Rican social ecology at the micro level and at the macro level in the Caribbean and in the world. The economic forces provoke chaos in Puerto Rico and also other forms of chaos like social and environmental chaos. As opposed to doing stupid things [referring to the Puerto Rico government and environmental agencies] which is what creates chaos on the first place, we [those outside the government] could solve major problems by investigating and having a broader vision of the issues on question. …solutions that do not stick to the past because this lack of vision has been our major challenge. Puerto Rico solutions are out of place and time and are obsolete. There is no vision at the institutional level, nor the willpower to search for a change...
> Interview transcript 012 [75]

[75] A local community leader in the 1990s who worked closely with the Puerto Rico Sea Grant in the west side of Puerto Rico, today she is a member of a non-profit and non-governmental environmental group that promotes empowerment of communities and environmental stewardship. Today, this leader does not work with Sea Grant but continues working in other community organizations in the island.

The above montage of pictures shows the Isabela's dunes in the northwest region of the island.[76] The black and white picture is back in 1970s (reproduced from the Report to the Government of Puerto Rico 1974), and the color pictures are the illustration of some areas today (provided courtesy of the Puerto Rico Sea Grant). This is a landmark for many locals who remember playing back in the 1950s to 1970s before these were completely eroded and extracted by "sand trucks to be used for construction purposes." This section demonstrates how PR has experienced one of the fastest -growing, coastal and urban development processes on the planet. Puerto Rico has a construction sector that is the primary engine in its economy. According to one of the respondents who has been in the program for 20 years indicates that using "the US definitions of 'coastline', PR would be entirely composed of coastal territory."[77] Therefore, examining coastal and

[76] Isabela is a Puerto Rico coastal municipality in the northwest region. This 'municipio' is well-known for their sand dunes and surfing attractions.

[77] Interview transcript 003. First an advisor and today an agent, this person was born and raised in Puerto Rico. Passionate with the ocean and fishing decided to pursue social sciences to integrate the sea and culture into marine and coastal management. The agent studied a BA in PR and a PhD in the US. Then, decided to return to the island to practice the career and joined Puerto Rico program back in 1980s as a marine extension agent. During the time at Puerto Rico program moved from extension agent,

marine development is important in order to understand the threats to PR's coastal and marine ecosystems.

Rapid development will be discussed in this section as the bridge factor between general trends in Puerto Rico, its specific coastal issues, and broader contemporary dynamics of social and environmental change. Some factors that affect the rapid development of the island include: urban sprawl, coastal development, tourism, high population density, small land extension and non-sustainable use of resources, focusing on the most visible ones. Urban sprawl in PR, as defined by Luis Santiago, is characterized by low density, significant consumption of agricultural lands, and almost total reliance on the automobile as a means of transportation.[78] Sprawl encompasses both residential (mostly single-family housing) and nonresidential development (shopping centers, strip retail outlets, industrial and office parks, and public buildings). In PR many of the major factors for urban sprawl were and are present: population density, land consumption, private transportation, and commercial activity.[79]

Second, the coastal zone is a 'new' space for leisure and a landscape of high aesthetic value that "attracts a large number of visitors, and investors (Valdés-Pizzini 2001:1)." Puerto Rico's coastline is affected by large number of visitors and investors who have the capital to spend in the upscale price of any property on or near the coast.

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administrative and research positions. The person worked for 20 years in the program and today still works in the program.

[78]Luis Santiago, MA is a Puerto Rican urban planner who is a professor at the University of Puerto Rico-Río Piedras Graduate Urban Planning School.

[79] Luis Santiago M.A. unpublished thesis. Santiago's thesis work aims to understand the development of sprawl in metropolitan areas, examining the behavior of variables associated with urban sprawl, namely population density, land use, housing characteristics, and transportation during the study period 1950 to 1990. It uses a trend analysis of sprawl that focuses on the behavior of these four variables during the period 1950 to 1990 in PR Since urban sprawl is a relatively recent phenomenon tied to the increasing use of the private automobile, it seems reasonable to focus on an examination of sprawl trends beginning in 1950, a time when private automobiles were becoming increasingly prevalent in Puerto Rico, and ending in 1990, the year for which the most recent population and housing census data are available.

Moreover, “coastal gentrification”, development and urbanization are highly correlated with an increase of people living in the coast. It is relevant to point out that not only are people arriving from the outside to invest the capital on the coast but also a large number of people are moving to the coastline in general. Both the prevalence of people from the upper class and the number of people living in the same place --the coast-- create new agents who are affecting the marine and coastal resources. Third, tourism is the fastest growing sector in the Caribbean economy, and PR is not the exception. As a result, during the past 30 years many coastal areas in PR have undergone intense development.

Third, the island population density is among the very highest in the world. Three million and nine hundred thousand people live in PR, approximately one third of them within the San Juan metropolitan area. One third of Puerto Rico’s population then lives in and around the five to seven San Juan municipalities, which reflects Puerto Rico’s finite geographical, spatial and resource boundaries. Puerto Rico has a high population density and a rapid construction development that has been intensely fueled since the 1950s to the present; as a result, conditions are more than ripe for the rapid depletion of remaining natural resources.

The below photo (courtesy of Puerto Rico Sea Grant) shows an aerial view of San Juan, Puerto Rico’s capital, where the coastal development is considered to be one of the most ‘unplanned coastal areas’ across the island, and possibly around the world, for the most part for tourism and economic growth purposes. This photo shows the self-explanatory result of some of the major processes that presently affect Puerto Rican coastal and marine ecosystems later on time than the US. These processes are: coastal gentrification, the rise of the environmental movement, the coastlines as a haven, the

demise of agriculture, the rise of industrial development, urban growth, tourism and leisure space, and the constructor sector.[80] However, the main process that affects the coast of this island and many other places in the world is coastal gentrification.

Coastal gentrification is a complex process. It involves "the displacement of traditional settlers and the traditional uses of the coasts" in which the coasts become "a new space (Valdés-Pizzini 2001:1)." This coastal development "focuses in the construction of high-end condos, hotels, resorts, and houses whose prices make these housing units unattainable for [the] local population (Valdés-Pizzini 2001:1)." In Puerto Rico, coastal gentrification is happening at large scale: a good example is the Río Grande,

[80]Valdés-Pizzini is a cultural anthropologist who wrote this article to assess the socioeconomic and political factors transforming the coastal communities in PR This is a work to expand the scope of an initial research conducted by Marialba Hernández in order to provide sociological assessment of the environmental contentions in the coastal zone in PR This report outlines and critically assesses the main environmental problems occurring in the coastal zone of PR, and briefly analyzes, in historical perspective, the process of social and political participation of the environmental movement. The main argument presented here is that unsustanaible growth is expected.

a landscape that once comprised 14 kilometers of beaches in coastal plains and sugar cane plantations. In Río Grande, the government removed coastal settlers from what they considered communities immersed in “pestilent”, “unhealthy”, and flood-prone mangrove areas. With the poor removed, two corporations bought most of the idle land in the coastal zone. The string of projects, including the voracious consumption of coastal lands and beaches by resorts and housing developments, was impressive. As a result, the Río Grande like in other ‘municipios’ such as San Juan, population lacked appropriate access to their public beaches, to the extent that there is no public road providing physical or visual access to the coast in the entire municipality (Valdés-Pizzini 2001:11).

In sum, the island has been dramatically transformed in the last 50 years. “In PR and the US Virgin Islands, marine agents are confronted with issues of coastal gentrification, coastal land use, industrial and tourism development, beach access and ethnicity problems (Valdés-Pizzini 1990:16)”. Each of the above-mentioned factors individually presents major challenges and difficulties to the future of coastal and marine resources in PR; in combination, these factors make appropriate and vital the examination of PR, a microcosm of global coastal dynamics.

Forging a Partnership with Academia: The University of Puerto Rico

> In any conversations with scientists in almost any Latin American country, two problems come up again and again: lack of resources and slow access to materials…But both are largely beyond the control of either the scientists or the science ministries… In ascending order of difficulty, these are: a reluctance to accept outside peer review; the lack of regional integration in science; scientist’s grudging acceptance of the free market; the pressing need for a university reform; and a failure to acknowledge the importance of intellectual property rights in modern research (Nature 1999:A4).

According to many of the voices in this exploratory project, there are many situations that are particular to a territory like Puerto Rico, which is influenced and assisted by the US yet also draws on historical experiences similar to those of other Latin American countries. Many of the situations that the respondents mentioned are addressed in the quote above and are associated with the university-partnership in which Puerto Rico Sea Grant is located. Some situations include: a lack of resources, slow access to materials due to a lack of locally published material, lack of collaboration, university-wide system inefficiency, and failure to acknowledge research as a primary engine for today's world.

This quote summarizes many of the pressing issues that are immediate to the Sea Grant's marine extension programs and its agents in this case, inside the UPR The university partnership is as important as the idea of Sea Grant itself, as it determines many of the possibilities of development for the College program. This section will briefly describe the UPR system, its structure, and how it affects the role of marine extension agents. Then, in Chapter Four, I will analyze the voices of agents themselves, as they described to me the effects of this university partnership on work achievement.

The UPR, a public institution, is the most important formal university in Puerto Rico. Being part of this university entitles specific places and positions to those inside Puerto Rico Sea Grant program; Sea Grant is very different from any other research center on the Mayagüez campus because it responds directly to the chancellor, who is responsible for managing the entire campus, and it is as it is typical attached to an academic department. In addition, those located inside this program are part of the university-system, and receive funding from it. This link to the university both as a host

and as a distributor of funding, positions marine agents in a research associate position and not in either a purely professional or a purely academic tenure-track position. In general, because the UPR serves as the Puerto Rico Sea Grant host, both benefits and constraints are created. These will be discussed in a later section in which the agents themselves express their opinions on this topic.

Colonialism: the Framework for United States and Puerto Rico Relationships

"Puerto Rico is a fascinating case study in the history of imperialism…in a sense, the [US] political presence throughout this past century can be simply as a special manifestation of modern-day colonialism (Darrell-Bender 1998:30)." The US presence in the island is "diffused, impersonal, institutional presence rather than confrontational…Puerto Rico's nationality is a dynamic and autonomous amalgam of many influences (Darrell-Bender 1998:37)." Lynn Darrell-Bardel (1998) explains how "cultural sensitivity or responsiveness to the desires of the 'native' population were hardly priorities for pro colonial consuls and much less they were interested in or politically capable of responding to the petitions and demands of Puerto Rican political elite (Darrell-Bender 1998:41)." The PR representative system (i.e., a republican form of government with governmental structure, bicameralism, the tripartite separation of powers, popular elections, etc) "far from a slavish copy of the US model… fits comfortably [with] the US scheme and expectations, as the US congress recognized upon ratifying it (Darrell-Bender 1998:49)".

For example, the local government structure "differs significantly with that of normal models of US states. It is simpler and more fully integrated into the centralized structure of the island at large. …The patterns of centralization [of PR central

government] characteristic of the island politics at large are clearly repeated on the municipal level (Darrell-Bender 1998:52).[81]" The two intertwined polities that are present are the institutions of the federal government in close conjunction with the constitutional and political authorities of PR in ways that vary only slightly from what occurs in the 50 states of the Union (Darrell-Bender 1998:52)." It was here [in PR legislative branch] that the inevitable pulls and tugs of a colonial situation were played out (Darrell-Bender 1998:41-42).

However, the US Congress, "as the sovereign power over PR (according to the US Constitution and the Treaty of Paris which ceded the island to the US) has the final say as to the nature and structure of relations between the two polities. And the attention of the executive branch depends in large part of the importance that territories such as PR have in affecting matters of direct and crucial national interest (Darrell-Bender 1998:38)." For the purposes of this essay, colonialism will be addressed only briefly, as a signal to readers that while it is beyond the scope of this study, it does affect the specific political and professional contexts where Puerto Rico Sea Grant marine agents work.

A Unique International Program: Puerto Rico as Distinct from Other US Sea Grants

In the late 1970's, Sea Grant initiated the *Marine Advisory Project* in Puerto Rico. The project was based and managed at the University of Puerto Rico at Humacao campus on the east coast of the island. It was established as a result of an act of public policy. In 1974, the university intervened and participated in the planning of the Coastal Zone and

[81] A 'municipio' is one the 78 geographical and political divisions existing in the island of PR There are no counties or separate local jurisdictions between countries, towns or cities. The 'municipios' are tight political units, each one of which forms a single territorial constituency for electoral purposes (Darrell-Bender 1998:522).

published *Puerto Rico and the Sea*, which established the standards for the sustainable use of marine resources.[82] In the beginning of the 1980's, the program was moved to the western side of the island, UPR at Mayagüez. In 1981, in association with the Farley Dickinson College and the University of Virgin Islands (UVI), the UPR program developed a Marine Advisory Project which became a partner in many of the extension activities that the program carried out in PR In 1980, the UPR established a comprehensive program --the second level a university can achieve -and later in 1989 attained 'College' status (Puerto Rico Sea Grant Strategic Plan 2000) .[83]

The Puerto Rico program is divided into three offices: the UPR at Mayagüez- main administration office, the UPR at Humacao- Center for Marine Education, and the Virgin Island Marine Advisory Services (VIMAS) program.[84] The program is administered primarily at the UPR at Mayagüez but it has partnerships at other campuses within the UPR and other universities in the island.[85] The program has had three directors and today is waiting for a fourth director to be appointed this year by the UPR President.

Puerto Rico Sea Grant has a unique position within the national Sea Grant initiative. The most relevant and unique characteristics of Puerto Rico program include, as mentioned before, its unique position between the US and Caribbean and Latin American worlds (this is facilitated by its two languages); its role as a program with

[82] The governor requested this document for the first time in the beginning of the 1970s. Nearly one hundred citizens of PR worked closely on a voluntary basis to create this report. This report calls for a strong program in marine affairs on the part of the government, industry and people. The document was highly influential as it was the source of legislative bills and proposed regulations. It was a non-partisan, non-advocate effort in favor of the best for the commonwealth. It had six subcommittees which included: living resources, recreation, coastal zone management, research and development, institutional arrangements and the role of Puerto Rico.

[83] See chapter two, section titled *On the Benefits of Being "Sea Grant."*

[84] The Mayagüez office has the extension program main office, the Puerto Rico Sea Grant Marine Information Center, a publisher, and a main office for the administrative staff (communicators, secretaries, etc).

[85] The Puerto Rico program is located in Mayagüez. Nonetheless, it works in collaborations with other UPR campuses and other Puerto Rican universities and colleges.

international elements; the late origin of extension work and marine extension relative to the mainland US, and a difference non advocate practice as agents compared to the national mandate.

In many ways, the fact that PR functions in two languages enables professionals there to receive the attention of a larger audience than those in either the US or Latin America. This makes it potentially influential, at an international and macro-regional scale. This status as, in some ways, the most "international" of Sea Grant locations, can be seen from the links between PR offices and another office in the US Virgin Islands (USVI), which allows regular contact not only with USVI but also with other countries in the Caribbean region.

Such a wide network/audience means that models for extension work that may be unique to PR also have the potential to spread. The current challenge for extension work more broadly is determining how to 'adjust' local programming to coastal management needs and how to effectively maintain marine extension work within a fast changing set of dynamics at a local, national and international level (e.g., institutions, agents, stakeholders, interests, pressures on resources). It is thus important for us to hone in on a history of extension work in PR, examining what distinguishes it from extension work in other US Sea Grant sites.

One characteristic that distinguishes PR is the late origin of extension work and thus of marine extension. Puerto Rico has a very young marine extension program (developing between the 1990s and 2000s) and it has no other program to split their responsibility in the island. It was not until the end of the 1970s when PR began to have

conservation and management institutions. Some of the most prominent federal and local state agencies created were the Department of Natural Resources (DNR)[86], the Coastal Zone management plan, NOAA's National Estuary Program and the Caribbean Fishery management council. Having a very young marine extension program and sharing responsibilities with no other program on the island makes marine extension development difficult. Putting marine extension into place is not easy, even in a place like PR, with its privileged relationship to US legacies and resources for such work—let alone many other countries which are in need of extension, marine extension, or similar programs.

Within those US legacies, over time the objectives of the extension agent were met through a variety of techniques, responsibilities and skills. Recognizing the value of extension work took almost a century as it was described in the history of extension work in the United States.[87] In the beginning, extension work encompassed a variety of activities and goals, and agents were expected to be in many senses generalists. Today as more information is available and academic programs are developed, each marine agent concentrates in one of the many areas that affect marine and coastal areas, of special interest here in coastal management and tourism.[88] Because generalist and specialist status and positions are not as defined in particular in a program like Puerto Rico, such specialization does not, however, prevent them from serving as pivot points for major conflicts about coastal management:

[86] This is a public or a state-run agency. The DNR is not an isolated agency but it works together with other state-run agencies such as Environmental Quality Board (in Spanish JCA), Administration of Laws and Permits (in Spanish ARPE); Planning Board (in Spanish JP), to mention a few.

[87] See chapter two section titled *Extending Extension Work: Beyond History into Current Challenges* explains a brief history of extension work in the US

[88] Although in program like Puerto Rico marine extension is still a very hard task to differentiate between the specialists and the generalists, in part because there are no only specialist's positions as in other Sea Grants like Michigan Sea Grant.

> A case in point is the use of fishing resources by recreational and commercial fishermen. MAS [Marine Advisory Service or Puerto Rico Sea Grant Extension] contribution to the agenda of one group inevitably carries the difficulty or endangering the agenda of another group. One group intends to de-commoditize fish, to take it out of the market sphere into the realm of leisure and conservation, while the other intends to commoditize fish and keep it in the sphere of commodity circulation (Valdés-Pizzini 1990:16).

This brings us to what may be the most crucial difference in the conditions under which marine extension agents work in PR versus elsewhere. Taking a non-advocate role by Sea Grant agents is one of the most difficult tasks to accomplish "but MAS [Puerto Rico Sea Grant extension] participation in such processes cannot be curtailed nor postponed. … (Valdés-Pizzini 1990)." Valdés-Pizzini expands on this topic saying that Puerto Rico program as a result of its history and realities needs to provide a different form of practice than the non-advocate role mandated by the national office.

> MAS [Puerto Rico extension] personnel have to be constantly reminded that the domain of their duties is essentially social and cultural… I hope that the fear of non-advocacy will disappear from the horizon of MAS and Sea Grant. Extension services cannot stand by passively while interest groups and government agencies behave in contradictory ways. To use marine resources appropriately, one has to understand and explain the process of governance, but critically (Valdés-Pizzini 1990:16).

Valdés-Pizzini goes to say that he sees that "fortunately the path of anthropology and social science in Sea Grant is heading toward that direction (Valdés-Pizzini 1990:16)." He explains that the pathways toward that direction are the analysis and critique of coastal zone planning and policies, enforcement and political ideology, patterns of governance of environments and history of resource management regimes and user-groups.

Puerto Rico's position offers a microcosm of today's world. Puerto Rico, a country with finite yet 'unmanaged marine and coastal resources' confronts pressing problems such as rapid urban and coastal development which place stress on these natural resources leading it to take new avenues, leaning on the idea of agents as advocates for different groups along the way.

Economic Growth versus Environmental Protection; National versus Local Needs

"An island which has finite boundaries and resource boundaries is constrained by the objectives of the national office" stated one of my respondents. This marine agent worked for six years in the 1990s in the Virgin Island office of Puerto Rico Sea Grant and today he is not currently in the program. He studied a BA in the Caribbean and a PhD in marine sciences in Puerto Rico.[89] This agent in a simple and very open manner establishes one of the major challenges that extension faces inside the Sea Grant model.

Puerto Rico, as we have seen, is located in a very unique relationship to the national office. A challenge to the PR program is that "traditionally, success in the Sea Grant Network has been judged by the member region's ability to develop new technologies for increasing productivity, which can be measured in dollar amounts (Puerto Rico PAT Briefing Book 2001:2)." Puerto Rico is in a tropical, insular environment with limited coastal and marine resources compared to the United States. This anticipated goal of profit or productivity is combined with ideas of accountability, audit cultures and efficiency that are true during this time and these concepts were signaled in previous chapters and in the next chapter we will listen to the voices of the agents themselves how these affect their recent work history.

[89]Interview notes 001

Sometimes PR's 'different' position may raise issues or barriers like how to apply for funding when there are other local problems on the island, or how to follow the national mandate while providing good support to the local settings. For example, Puerto Rico is an island where the pollution and deterioration of the environment will raise faster effects on Puerto Ricans, public health and the general island economy. How a small island can follow mainland mandates that have in their vision a different land-mass size, population number and scope both in subject matter and urgency. As a result, the Puerto Rico Sea Grant program proposes a re-definition to the National Sea Grant Office. As the political and economic stability of the Caribbean island nations depends heavily on their coastal and marine resources, the Puerto Rico Sea Grant becomes an attractive site for national programs like Sea Grant to develop.

At some level, the PR program objectives can be different from those of the national office, but there are also objectives that are shared across these levels or contexts. Similar objectives include mission goals and strategies for environmental stewardship. Also, many of the major topic areas within their national mandate are present in the Puerto Rico Sea Grant strategic plan.

Chapter two provided a background about the National office, while this chapter has provided background about Puerto Rico. This has allowed me to present the key players and important external conditions faced by marine agents, who are the center of this study. We will listen to their voices and to their work histories in the following chapter.

Chapter Four-

Marine Extension Work History: Local Autonomy versus US National Mandate

> The absence of strategic vision in Latin American society,…is translated into an immense and absurd loss of many best researchers, who emigrate to developed countries where their work is recognized and value…Any serious effort to develop Science and Technology must begin with a programme aimed at retaining researchers and using their creativity and knowledge to benefit the countries of the region, while maintaining close communication and collaboration with those scientists who have already emigrated (Cetto and Vessuri 1998:20-21).

This exploratory project examines marine agents as they understand their daily demanding and uneasy position, exposing both the contestation around their roles and also the crucial roles they play in natural resource management, especially in Puerto Rico, as well as the rest of the world. This study also presents the question of how these agents can be retained in their positions and in the Sea Grant program. Retaining agents poses major issues to programs like Sea Grant and public academic institutions in countries like Puerto Rico (PR), who must find incentives for these professionals to stay. Future research work must be done to develop strategies for retention. Institutions like the University of Puerto Rico (UPR) must overcome the challenges these researchers and professionals face and offer them motivations to stay. How to retain agents provokes the need to develop vision, mission and application of comprehensive models like the Sea Grant (SG) and multi-faceted positions like the marine agents where all multiple aspirations can be harmonized.

This study examines the agent's views and understandings of themselves. [90] Conducting, analyzing, and writing up this research posed for me the analogy between

[90] Since this is the chapter presenting the bulk of the findings from interviews, its format is different from other chapters. I will quote at length often from the responses of study participants, following such quotes with a paragraph, sometimes in italics, that will give a brief and useful description of the professional background of the person quoted.

the experience of ethnographic fieldwork and extension work, and suggested that in some ways these agents enact roles as cultural "brokers" or "translators" similar to those enacted by anthropologists. On a more practical or programmatic note, through the examination of these agents a better description of local dynamics and how the Sea Grant message is translated to the public can be captured.

Future work examining how the agents are perceived by the government and by environmental regulatory agencies may be important to establish better and stronger alliances. Moreover, an examination of how the Puerto Rico agents are viewed by other Sea Grant agents can be useful in future collaborations and the establishment of an effective network.[91]

> I believe one of the areas in crisis in the extension…is to be a non-advocate, meaning that you cannot support one person or group or anyone. When the fishermen have problems in their coastal communities or when the government has problems as an agent you need to make them recognize each other functions, responsibilities and the existing permits and laws but also you need to identify their needs...sometimes as a marine agent you need to support the coastal communities and sometimes you need to support the government. That gives a lot of work to balance, but a lot of work![92]

The respondent quoted above holds one of first PhD degrees conferred by the UPR system and he has worked in one of the components of the new extension program in the Puerto Rico program for over seven years. He has dedicated most of his professional life to the promotion of marine literacy and education among teachers and non-scientists. A major contribution while at the Puerto Rico program was to work in the development of much needed curricular materials on marine topics for the pre-college level and its integration in the PR regular educational curriculum. Today he is not in the

[91] Puerto Rico agents refer only to Sea Grant marine extension agents as apparently there are no corresponding marine agents in any other organization or at the government in the island.
[92] Interview transcript 014

Puerto Rico program but he continues to work in environment related positions in the island. His voice illustrates well the situation of marine extension agents at the crossroads of the Sea Grant tripartite three core goals or mission --research, environmental stewardship and commerce.

This is the heart of this study: telling the agent's experiences and letting their voices convey their recent work history. This chapter focuses on their voices as they relate to their job description, work demands, work ideals, and the practice of marine extension work.[93] The previous chapters provided extensive peripheral background to better understand the setting of these actors. This chapter focuses on the marine extension experience in light of the SG mission of commerce, research and environmental stewardship within the Puerto Rican local context. At some level, one aspect of the focus of the chapter are the silences or gaps for extension work which can be categorized as the conflicts between UPR, Puerto Rico Program and PR politics. These conflicts do not just exist on the abstract level --they create real and significant problems and anguish for the people involved-- the demoted agent, the fishermen. Ultimately, these conflicts make environmental protection and mediation, the goals of Sea Grant, difficult or impossible in some cases. The chapter will describe the day-to-day operations, the transformation and changes over time of the agent's work demands, the practice and the challenges relative to the island's context and ultimately will address the areas of silence and gaps.

[93]This exploratory study was composed of an archival phase followed by an oral history phase focused on listening to the marine extension agents' voices in order to reveal aspects of the changing role of coastal management and tourism during the decades of 1980-2000 in Puerto Rico. Previous to the oral history phase, an archival work phase provided background and preparation for the semi-structured interviews. The oral history was divided into various staff positions: administrators, marine extension agents, communicators, educators and community leaders. Each of these positions was or is marine extension agent and/or has worked directly and extensively with them.

Task Variety: The Atypical Nature of Marine Extension Agent Work

> As an agent, I received too few instructions.
>
> *One of the first marine advisors recruited back in the beginning of 1980s and who has been in the program for more than seven years and stayed in the extension program mainly as an agent*.[94]

> The work of the marine extension agent is not a regular eight-hour a day/40 hours a week job; it is unusual. The extension work has field visits, constant contact with coastal users, and a variety of tasks (e.g. administrative, educational, extension, research) to complete. As many of the agents expressed, it has excitement, too.
>
> *The marine advisor was born in Puerto Rico. The advisor studied a MA in marine sciences in PR and a PhD in the US. This advisor was one of the first extension agents in the beginning of the 1980s who work for about three years at the Puerto Rico Sea Grant and is not currently in the program. After Sea Grant, the agent decided to stay in the US due to higher salaries and better conditions at the workplace*.[95]

Although marine extension agents describe their work with a general tone of enthusiasm, the job description of marine extension agents includes a wide range of skills and responsibilities.[96] Therefore, despite their excitement, their work is often disorganized due to a lack of schedules, routines, and centralized management; the majority of the respondents could not establish a routine for their daily activities. The enthusiasm of the marine extension job cannot be separated from the constraints and barriers each of the agents lived or are living while they work in this 'novel and refreshing' experience, as some extension agents described. The voices of these actors were full of excitement but also tinged with disappointment that in the end was evident in

[94]Interview notes 009
[95]Interview transcript 015
[96]001, 005, 006, 007, 008, 010, 011, 012, 014, 015 are all interviews where respondents expressed this type of enthusiasm when they needed to explain the role of the marine agent in the island.

many of their stories.[97] Some disappointment comes from the conditions in which the agents worked. In an era of expanding norms of corporate productivity and accountability (Strathern 2000), as time passes, their work, the amount of responsibilities and the number of clientele makes their task harder to manage and the amount of reporting and documenting asked of them increased too. In some ways at odds with agent's unique professional and social identities, and while designed to make their contributions clearer and more routine, at present these conditions seems primarily to make their tasks harder to manage and more difficult to achieve.

Marine extension agents interviewed in this study in the Puerto Rico program had one of the following positions: administrators, marine extension agents, communicators, educators and community leaders.[98] Each of the positions was mentioned as part of the respondents' background description in the interview. Examining not only agents but also related positions is important in order to reconstruct how the various voices overlap. Having intersections on the interviewee's voices contributes to a better understanding of how the PR extension program works.

To examine the atypical nature of the extension work and to offer an idea of how Sea Grant has changed historically in Puerto Rico is useful to better understand marine extension. The Puerto Rico office has only one extension secretary for example;

[97]The next sections on this chapter will concentrate in the reconstruction of the collective story described by 15 respondents using the partial list of topics used to produce substantial and vivid information of the work of a marine extension agent in Puerto Rico. The partial list of topics used in the oral history phase included: motivations to join Sea Grant, career development, examples of marine extension programming or projects, ideal view of marine extension, challenges and relationship to other Sea Grant programs and the National Office.

[98]The administrators are the directors. I interviewed all of the past directors and some of the expected staff that may be appointed to this position in the near future. Collecting the directors' views, who were also extension agents, helped to delineate the history of the Puerto Rico Sea Grant from the high management perspective. The marine advisory agents, or marine extension agents as they are named today, were divided into groups according to their academic backgrounds and length of time in the program, for analytical purposes. Today, the marine extension agents at the Puerto Rico program have various statuses: full-time and part-time agents.

therefore, agents are responsible for many of their own administrative and planning responsibilities. The PR marine extension program from its origin until the end of the 1990s was separated from the other areas of the program (e.g. education and communication). By the end of the 1990s, there was an internal re-organization of the program, and as a result, communication and education areas are now a part of extension.[99]

The extension program, a branch within the Puerto Rico Sea Grant, has various offices located throughout the island. The extension program assists the entire island, small islands and their islets and the US Virgin Islands. The agents are divided into the following offices: Virgin Islands Marine Advisory Services (VIMAS), the central SG office at Mayagüez, and the San Juan office. VIMAS is located within the Center for Marine and Environmental Studies at the University of the Virgin Islands. VIMAS was established on the St. Thomas campus of University of the Virgin Islands in 1984 and later expanded to include agents on St. Croix too. Currently, it holds two smaller offices on each USVI island. The extension program leader and three agents are housed in Mayagüez. In San Juan, there is only one marine extension agent located at PR Department of Natural Resources.

The job description discussed in the interviews touched on the disorganized nature of marine extension agents' jobs and the practices of the respondents who participated in this exploratory study. These components set the stage for the following section --the transformation of the work demands looking particularly to the organization and day-to-day operations of extension agents.

[99]Today, the communication and education staff serves the extension area directly.

The Transformation of the Marine Extension Program[100]

> As an agent, I need to offer seminars, write newspaper articles, Puerto Rican bulletins, maintain an email list to stakeholders of current news, read and stay up to date in all business, work as a team, write routine reports to the program, prepare flyers about the extension activities, receive and give training, choose adequate strategies depending on the project/clientele, stay available for people, attend academic and professional events, etc.
>
> *A marine agent recruited in the end of 1990s who studied a PhD on marine sciences in Puerto Rico. Currently, still works in the program.*[101]

Agents do lots of things, but what are they? The work demands section explains a historical overview of how Puerto Rico Sea Grant and the duties of agents have changed over time observing the day-to-day work and organization of an extension program. The previous section described the marine extension job as one that requires multiple skills, capacities, responsibilities and multitasking competency. A closer examination of the transformation of the day-to-day operations of agents provides concrete examples of how marine extension works in order to understand its significance in relationship to SG's three core goals (e.g. environmental stewardship, commerce and research). The quote above mentions just some of the marine extension duties.

By the end of the 1990's, the extension program expanded to include communication and education components as a management decision to improve extension programming. Education in SG includes everything that is related to kindergarten to twelfth grade education as well as teacher training on marine sciences. Communications is a smaller component mainly responsible for public relations, publications, coordinating events, and for the dissemination of all information including

[100]This section will be referred as the work demands for Puerto Rico marine agents. This section touches only on the SG marine extension program. Even today it does not seem that there are any other agencies with marine agents in the island.
[101]Interview transcript 006

that which is to be reported to the National Sea Grant Office. In SG, communication means the dissemination of information to user-groups and clientele. Also within Puerto Rico Sea Grant communications is the Puerto Rico Sea Grant publishing house --the site that among other duties publishes all funding proposals and publications owned by the program. In summary, combining education and communication areas with extension meant having additional personnel and moving the publishing house to work directly with the extension program --a centralized strategy to concentrate efforts and human resources.

Another recent change within extension is that agents in the 1970s, 1980s and 1990s worked divided by geographical regions; in the late 1990s they became divided by specialization or expertise. The extension program is structured so that each marine extension agent works independently and establishes their own agenda (e.g., calendar, training, reports, and proposals) and programming based on their specialization. Each agent relies on other agents for information on topics that the agent is not familiar with.

Some side-effects that result from these new "administrative" changes in extension are based in resource limitations. The Puerto Rico program is relatively small in terms of its resources, staff, and agents, and it also serves a country with almost four million people unevenly distributed across the island.[102] Because of the incorporation of education/communications, as well as specialization, agents have more and more to do, without an increase in resources that would be needed to hire new agents and provide relief or more services to agents who may be overwhelmed with multitasking. The program is therefore burdened by an increasing number of PR coastal and marine issues,

[102]PR has a similar number of people per square mile as the US and has one of the longest road systems in the world. These two factors raise the point that there are as many people per car per square mile as the US.

but limited by the number of staff, resources available, and the number of issues for which an agent can offer assistance. Although extension now receives more support from the program, SG continues to have the only marine extension program on the island and it will therefore continue to face the majority of all the island's coastal and marine challenges.

The recruitment of agents and job requirements has changed over time, which is another aspect of the day-to-day operations.[103] It is important to comment on the requirements like the academic preparation or education of the agents in PR because they have shifted over time. In the end of 1970s, agent recruitment had no specific requirements.[104] It would not be until the last major round of recruitment in the end of the 1990s when the agents began to have PhDs. The recruitment of agents focused on various factors: academic preparation, participation during 1980-2000, length of time at the program, and availability (whether the agent was on the island). Even today, the academic backgrounds of the eight agents that were interviewed varied widely[105]. The recruitment of agents also depends on other characteristics of the island that will be discussed in detail in a subsequent section of this chapter titled *The Practice [or Challenges] of Marine Extension Agents*.

Another aspect that has affected the transformation of the work demands is the difference on the practice of marine extension in Puerto Rico. As it is envisioned in the core goals of the SG mission, the practice is different from the US scenario in the

[103] Out of the 15 semi-structured interviews, eight were or are marine extension agents

[104]The first major recruitment involved agricultural extension agents and the second major recruitment concentrated on marine sciences students. However, the people with masters or even PhDs in marine sciences were not available at this time in the 1980s.

[105]There were MAs in marine science related fields; PhDs in marine sciences (including water quality, seafood technology, fisheries), PhDs in cultural anthropology; and PhDs in resource management (including tourism and marine recreation specialization).

following ways. For example, in PR, economic growth is not seen to depend on coastal and/or marine resources (except for the construction and housing development sectors). Economic growth is determined by the manufacturing industry, followed by commerce, finance, insurance and then real-estate (Government Development Bank for Puerto Rico 2003:7). Research activity does not seem to be the primary purpose of the universities; rather, the universities focus on teaching, especially at the undergraduate level. The undergraduate level in PR represents 84.5 % of all degrees awarded by sector, level and academic area (Government Development Bank for Puerto Rico 2003:38). Furthermore, from the declarations of interviewees, it seems that there is no defined pathway to acquire tenure or tenure-track faculty positions and also seems to be a lack of a set requirement of publishing and/or the research experience while teaching and participating in administrative positions at the university level in Puerto Rico. Having no defined pathway and the lack of particular requirements that tends to be standard in the US, under a much more research oriented model, set a different context in Puerto Rico.

Environmental stewardship is also practiced differently. Conservation efforts began in the 1970s when the first environmental regulatory agencies were developed, beginning with the Public Environmental Policy law in 1970 which led to the development of the Environmental Quality Board and DNR in 1972. At the same time, various environmental groups began to organize collective environmental movements to protect the island's natural areas. Today, after only 35 years, these agencies and those with the responsibility to monitor the natural resources in PR are experiencing many management and internal problems, and are struggling to enforce natural resources regulations. The job description of agents is closely tied to the differences in practice of

the SG core goals in PR, because these events create changes in and challenges for the agents' day-to-day work.

Views, Understandings and Motivations of an Ideal Marine Extension Agent

> {on ideal qualities of an agent}…Honesty. Agents are between the National Oceanic and Atmospheric Administration and the public…agents must explain to the public…and do not try to say one thing and omit the other…That kind of behavior may put agent's credibility in jeopardy because I believe that if agents are honest and consistent people can trust them…the importance of extension is for people to understand what is happening, how they fit into the issue, and how can they make something to change.…another is punctuality. Many times the public ask questions to the agents and the agents do not respond, and if the agent does not respond to the public, slowly their relationship deteriorates…I believe the most important quality for an agent is his/her relationship to the public and all those values and actions that shapes that relationship. The agent and the public do not need to be friends, but there is a need for respect. For the agent to gain the respect he/she needs to be honest, punctual, and do as many things that says is going to do…another quality is to become a good communicator…a person that gives information but also receives and listens...communication with two-channels is the key for a successful agent. It is the agent who goes out to the field and knows the public's needs and can correct the mistaken views within the program to those that need the public….[106]

The agent quoted above is both a local community leader and a student in Marine Sciences, a person who worked very closely with Puerto Rico Sea Grant in the directive of the community organization in the 1990's agent's work ideals section examines the views or ideas that these actors have about the work as agents in an ideal world. The views and understandings of an ideal marine extension agent as spoken by those who are or who worked closely with marine agents demonstrated the skills needed to integrate the three arms (e.g., education, extension and research) of the SG three core goals (e.g., environmental stewardship, research and extension).

[106]Interview transcript 007

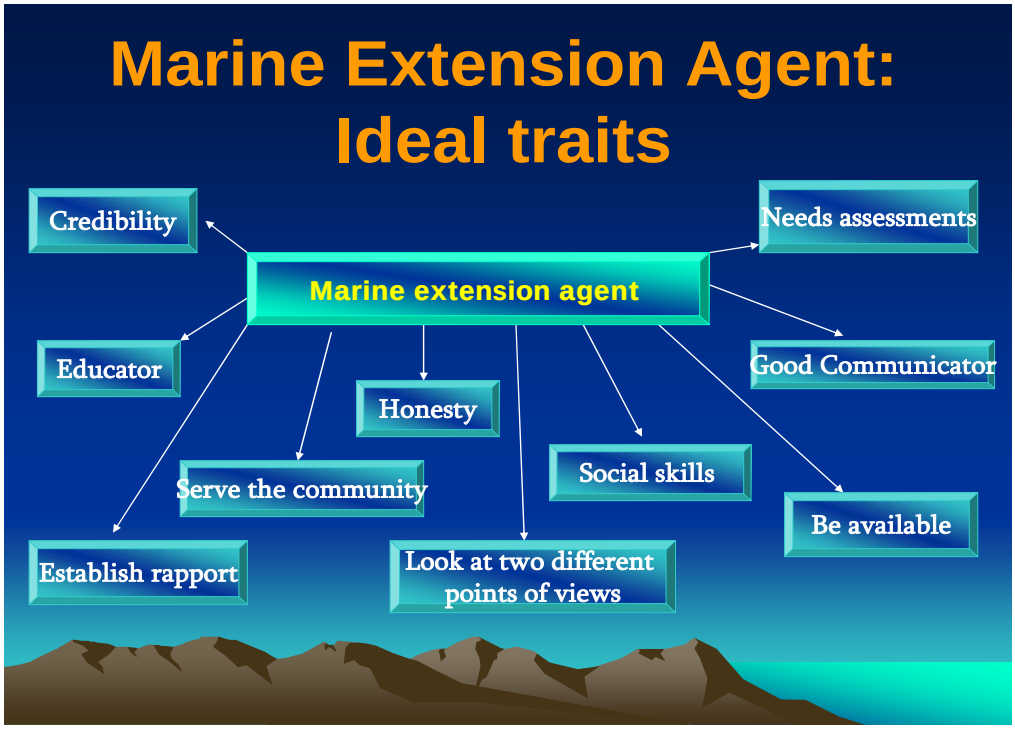

Figure 4 Aixa Alemán-Díaz—Slide from Poster Presentation at the 104th Annual American Anthropological Association Meeting in November 30, 2005.[107]

What is an agent? How do you conceive the ideal qualities of an agent? Some of the answer to these questions by the respondents were a person who has common sense, is a trusted person, serves the community, mediates, and who does not know everything but knows how to find the information he or she needs to get a job done. Also the answers reflected a person who is an educator, is available, is an excellent communicator, has credibility, is able to see many points of one situation, is sensitive, and is an agent of change were the most repeated answers to this question. An interesting pattern that can be drawn from all these characteristics is that the ideal qualities of agents are not related to their academic expertise or to their professional competence; the qualities mentioned are

[107] This slide summarizes respondents' statements about the most important qualities required for effective extension work; it reflects only the findings from this exploratory study.

better categorized in social or people's skills. This statement does not imply that academic expertise is not ever mentioned; rather that it was not mentioned as the primary skill needed to be an ideal agent.

The opening quote summarizes several of the ultimate qualities that an agent must possess, according to interview subjects: honesty, punctuality, the ability to establish a relationship with the public, respectful, and good communication skills. There are many other qualities in this quote that were not clearly mentioned by the respondents like having credibility, becoming two-channels of communication, being available, and assisting the clientele (i.e., researchers and educators) to know what are the real needs..

These findings conflict with the descriptions the National Sea Grant handbooks of extension programming presents. These handbooks emphasize the value of other qualities such as having a strong academic background, instead of the social and communicational skills to ensure that an agent performs an adequate or effective job. According to the most recent handbook on extension, "without research, there is little to do for extension. And from the SG perspective, there is little need for research without extension (National Sea Grant Office 2004:44)."[108] This quote implies that research and extension are equally valuable; indeed, SG's official statement today is to encourage and aim for the two areas to be weighted the same. However, extension has not yet built the respect and foundations to be seen as the same knowledge producer as research. In fact, was not until the most recent handbook published by the National office, that extension has been looked this way. Earlier handbooks claimed that professional academic preparation was highly needed to become a successful agent, not necessarily the research piece.

Although extension has struggled to be seen on an equal footing with research, Interviewee 007 gave a current example of how an ideal agent must act that supports how agents can be valuable producers of knowledge. The respondent describes an existing marine and coastal problem: sea turtle nesting. Typically, the focus of a project for sea turtles nesting follows strategies and literature from specialized fields of study like biology and ecology. These specialized fields suggest focusing primarily on one aspect of the issue such as the turtles, the nesting situation, etc. Thus it provides a lack of a broader vision of the habitats in which these turtles live and interact. For example, there is no consideration for environmental politics, the co-habitation of humans and sea turtles, housing and retail development, or the present risks to these sea turtles because there is too much focus on the health of the sea turtles and their nesting. The interviewee says: "[that] we forget [about] those fishermen who kill and eat them…or [about] the mega-resorts that will be develop[ed] near the place where the turtles nest. If many resorts are constructed, eventually there will be no places for turtles to nest." The respondent adds that extension promotes and must have a broader vision of the coastal and marine issues. The respondent suggests that this all-encompassing vision enables an understanding of the interrelation of all the factors and risks involved before making final decisions on the issue in question.

The interviewee touches on the point that due to the lack of coastal planning and long term vision, PR confronts repeated coastal and marine problems. Therefore, due to the undervaluing of positions and the types of knowledge provided by the agents, many times valuable sources of knowledge and potential solutions to current coastal and marine issues are disregarded. A traditional approach to marine problems (study of turtles and

their nesting places, etc.) does seems highly problematic and ultimately bound for failure --yet because agents are multi-tasks professionals who act as a bridge between marine problems and people and development, they can make sense of the problem better and potentially solve it. In other words, although traditionally marine agents are seen as aids to research and only valued for their formal education, their ability to solve/tackle tough environmental problems is due to other qualities – i.e., communication skills.

The agent's work ideals about themselves are also closely linked to their motivations for joining the program. On many occasions the agents refer to idealistic views of why they joined Puerto Rico Sea Grant in the first place. Each of the respondents had their own motivations to become part of SG and to work for environmental stewardship and to promote the responsible use of marine and coastal resources. Some motivations included a passion for surfing, environmentalist views, a strong identity as an islander, or a passion for the island itself. After listening to these motivations, a common ideal link is suggested: an idyllic interest in building a team inside Sea Grant. In order to change and inform Puerto Ricans' views and values about coastal management, the agents suggested that they wanted to build a team among the Sea Grant staff to accomplish this ideal motivation.

> …everything started with my BA on marine biology on the coastline. But I can say that my motivation to join SG goes far back. I was raised next to the beach. Typically, I used to go with my dad fishing. He was the person who gave me the enthusiasm for the sea and therefore I decided to study marine biology on the coastline…
>
> *Studied a BA in Puerto Rico and joined the Puerto Rico program by mid-1990s working in one of the Sea Grant components related to extension. Currently, still works in the program.*[109]

[109]Interview transcript 010

This respondent expressed a motivation that he or she sees the ocean and its resources as place where this person felt contentment and pleasure; many others expressed similar motivations such as surfing, fishing, etc. This person expressed that he or she was not an environmentalist but that the main reason to participate in SG stemmed from the devotion to the environment[110]. This devotion allowed this person to work to protect the places where she can enjoy the natural and coastal spaces, so these are there for future generations to enjoy the ocean treasures that they have and continue to enjoy.

> I think the challenges that Puerto Rico has is to make those who typically do not go to the beaches to become interested in conserving them. Puerto Ricans, and even people here in Rincón[111] who live next to the beach, do not go to the beach…not even once a year. I think the hardest challenge is to convince [the majority of Puerto Ricans] that marine and coastal resources are valuable.
>
> *The marine advisor was born in Puerto Rico. The advisor studied a MA in marine sciences in PR and a PhD in the U.S. He was one of the first extension agents in the beginning of the 1980s who work for about three years at the Puerto Rico Sea Grant and is not currently in the program. After Sea Grant, the agent decided to stay in the U.S. due to higher salaries and better conditions at the workplace*.[112]

Another motivation, an ultimate one for agents, is to join the SG based on the model behind the program. Although agents come from a variety of backgrounds and were inspired to join SG for a variety of reasons, they all share one common goal, respect and admiration for the SG ideals. Each interviewee indicated specific personal and professional interests similar to the goals of SG --protection of the environment, communications, partnerships, establishing personal contacts, and others. Because each

[110]Referring to the fact that environmentalists usually are seen as having "extreme" views of how to conserve the environment. Typically, in PR there is a general belief that the environmentalist does not want any kind of urban development or use of natural resources because there will be a negative effect on nature.
[111]Rincón is a small western municipality in PR located next to the coastline. Everyone who lives in Rincón has access to the coast within walking distance or at most five to fifteen minutes by car.
[112]Interview transcript 015

SG staff member connected the idea of the program to their personal and professional interests, they fit and joined the SG family.

It is the gap between the general public and the motivations of the SG staff that makes the SG agent's job ideal. These interviews were full of examples of how Puerto Ricans living on the island do not use or enjoy the marine and coastal resources. Many commented on Puerto Ricans' 'ignorance' and their denial of the importance of marine and coastal resources as this is an existing and pressing challenge that marine extension agents face --to convince the general clientele in PR of the importance of marine and coastal resources. It is also critical to the Puerto Rico program to create bonds between SG staff ideals and their clientele. Agents would be the perfect people to help bridge this gap and work with the public and encourage environmental stewardship --because of their skills in communication, listening, mediating, and thinking holistically (etc.).

The Practice [or Challenges] of Marine Extension Agents

The practice of marine agents on the island has challenges which can be defined as concrete obstacles that impede agents from achieving the integration of SG's three core mission (e.g. commerce, environmental stewardship and research) and strategies. The challenges will be divided among three major categories that are the sources for them: the national office, the UPR system and extension work. Within the national office there is only one major challenge that agents repeatedly described: becoming a 'non-advocate.' At the UPR system, there were a number of challenges related to SG's anomalous position inside the UPR system, UPR's position as an autonomous institution that simultaneously receives the majority of its total funding from the government, lack of academic programs and/or recruited personnel with background in extension work, and

lack of training. Extension work also presented challenges such as lack of publications, low-paying salaries, having no direct path for tenure-track positions, high-turnover rates, and how the job needs of outreach and people's skills and not necessarily professional expertise and how social skills needs to be better valorized by the program. The following three sections describe a list of the challenges for the practice of PR marine extension that were most often mentioned in the oral history phase of this exploratory project.

The National Office: the Dilemma of Becoming a Non-Advocate

One of most repeated challenges mentioned by interviewees was maintaining a 'non-advocate' role as mandated by the national SG office. Becoming a "non-advocate" means a person who maintains a neutral tone on actions and statements when solving an issue. Maintaining an active role as a non-advocate becomes very difficult when there are conflicts between stakeholders --especially between coastal communities and the government, industry, developers who have various interests at stake. Maintaining a neutral position, (e.g., across the PR government, conservation agencies, coastal communities, others) is one of the hardest task that a PR agent must perform. The challenges of becoming a non-advocate were discussed by multiple respondents; many also commented that SG needs a more clear definition of this matter. As quoted in a Shirley Fiske (1990) article in *Practicing Anthropology*, Valdés-Pizzini declared that "it is difficult to be a broker of information,…,when immediate action is needed to save resources." This article explains the role of anthropology and extension related to potential pitfalls about the non-advocacy stance:

> It is paradoxical that the goal of extension- an intelligent and informed public can be achieved only through advocacy, a critique of the governance and political praxis. …It is ironic that the 'traditional' agricultural extension role in reality encourages becoming advocates for their commodity groups …somewhat as anthropologists are advocates for their community groups. Much of the activity of agents …affects policy and political decisions…The population explosion in coastal areas and increasing multiple uses of the coast has broadened the work of marine extension agents. This means that there will be greater demand for people who can work with multiple interest groups and who understand maritime affairs from a generalist perspective (Fiske 1990: 4)

This last statement does not mean that by agents becoming non-advocates the issues are solved; but that the non-advocate role guarantees that all interests at stake will be on the table. But having a non-advocate mandate can create problems for the agents. As Valdés-Pizzini in "*Anthropological Reconstructions of a Marine Extension Program"* explained, referring to the history of the Puerto Rico Sea Grant "the non-advocacy trap creates morale problems in those MAS [agents] who firmly believe in the objectives of the organization. In some cases, it may encourage avoidance of controversial issues in order to remain distant from the trap of advocacy; such as I believe has been the case with our [Puerto Rico] program until recently (Valdés-Pizzini 1990:16)."

The UPR System: Operations of the University-Partnership for Extension

At the UPR system, the challenges that will be discussed are: UPR's position as an autonomous institution that simultaneously receives the majority of its total funding from the government, lack of academic programs and/or recruited personnel with

background in extension work, and lack of training.[113] First, SG's inconsistent position inside the UPR system makes people confused and how it works within this university system. Back in 1977 the program responded directly to the president, but then when it was transferred to Mayagüez it began to respond directly to the chancellor, not to a department as is typical of research centers. This is a confusing position because the research centers at this university system typically are under the support of a department.

> Universities have remained the main vehicles for scientific research, with financing provided primarily by governments…(Cetto and Vessuri 1998:10)

A second challenge is that the UPR system receives the majority of its total funding from the PR government and yet it is also an autonomous public institution. Being tied to the PR government introduces PR politics into day-to-day operations inside this formal public academic institution. The government of PR typically experiences shortages in funds and as a result it does not provide for sufficient funding to the UPR so resources are typically very limited. Furthermore, as Valdés-Pizzini clarifies in his article *Anthropological Reconstructions of a Marine Extension Program*, the PR government causes "incompetent management of coastal resources [by a colonial government]…due to lack of enforcement capabilities and intentions, and their political and economic commitment to certain interest groups and processes (such as tourism and industrial development)." Therefore, it is not only the fact that there is a close relationship between PR government and the Puerto Rico Sea Grant due to funding but also that other circumstances or issues raised shaping the liaison.

[113]An important note on this part: as it is evident that out of the three categories, the university-partnership is the one with the highest number of challenges, this may be the case because many of the aspects of the Sea Grant program are regulated by the university system.

> …a pool of valuable human resources has been generated, although there are always shortages and obstacles owing to meagre financing, the lack of tradition in scientific research and the innumerable tasks that need to be carried out to build up the nascent scientific structure.
>
> Although they are vulnerable to the vicissitudes of the government policies and generally receive meagre funding, national organizations…have served …[to] understand the importance of promoting basic research, of combining research and training in a university setting and, more recently, to build bridges between research and industry (Cetto and Vessuri 1998:4 and 9).

The patterns described in these quotes may happen today and the challenges of fragile funding opportunities and limited resources are particularly affecting the public universities that rely on the government for their funding, which cause the Puerto Rico program to be in the same position at some level. The particular patterns affecting the UPR system such as shortages and obstacles owing to meagre financing, the lack of tradition in scientific research and the innumerable tasks that need to be carried out by researchers have generated an emerging pool of human resources and shaping the university research goal as its major role. For instance, the total funding that the institution and the researcher receive may be higher every year depending on a number of grants and varied funding sources; however, the UPR system has financial regulations that may perhaps mandate that all or part of the funding go into a common budget, which may obstruct or simply delay that the funding go to its anticipated purpose.

> The idea of a university as research centre developed in Europe in late 19th century, arrived late in the New World, and only in 1920s did science evolve into an integral part of provided in the universities [in Latin America] (Cetto and Vessuri 1998: 4).

The delayed arrival and development of higher education is also a reality in PR The UPR was founded in1903 and it was the first public university in PR Yet it was not

until 1976 when the first person graduated from a graduate program in PR Therefore, the development of graduate programs in general and thus of academic research happened much later than in the US, occurring around the 1980s and 1990s. If we compare these dates to the ones in developed countries like the US, the development of higher education was delayed in PR This fact does not suggest that there are no researchers, funding, research centers, or training for a research university, but that even today in 2005 PR seems to be only at early stages of having 'academic research' institutions compared to the US.

This late academic development also raises resulting challenges like the lack of academic programs and/or recruited personnel with background in extension work. In the island program, agents usually have had a strong academic background in the hard sciences but not in social sciences or communications, which are useful fields for extension work as respondents reiterated in the previous section titled *Views, Understandings and Motivations of an Ideal Marine Extension Agent* in this chapter. They mentioned that social and communicational skills were needed by agents as relevant skills to become successful in their task. Historically, college education in PR, like many other processes (e.g. urban development, coastal growth, commerce, etc) has been delayed compared to the United States.[114] Currently, marine sciences and related fields that would help prepare potential marine extension agents in PR are non-existent or minimal. In addition, many of the island past and present agents or extension-related staff were trained and educated in the United States. Nonetheless, most recruited persons were originally from the island and mainly graduated with PhDs from PR marine sciences

[114]This statement does not suggest that PR copied and/or follow U.S. processes; it only suggests that there is a difference in the timing and the development of these processes.

program. Both the marine sciences undergraduate and graduate programs are relatively new and, as of today, no future programs are planned.[115] In general, recruitment of agents may or may not correspond with the development of marine education on the island. However, if the basis to prepare professionals --such as academic programs-- is not available in the island, another challenge arises: lack of training or continuation of education to prepare extension staff at the Sea Grant Program. Another challenge related to the lack of training suggested by the agents is the lack of team effort and skills needed to train each other in the same areas (i.e., to "replace" each other if needed). The lack of team effort is not because they are too specialized or have bad relationships among themselves, the statement was made as these agents have many responsibilities they do not have the time or maybe the lack of resources that allow them to prepare this type of professional exercise.

> For the 33 countries [Latin America & the Caribbean] extending over this large and diverse region of the planet, the number of titles [journals, published articles] in each discipline is minute…It is likewise difficult to find Latin American titles on the bookshelves of libraries outside the region; it is thus appears that colleagues across the world are interested in the contributions to science of Latin America & the Caribbean only when they are published in the mainstream journals (Cetto and Vessuri 1998:12).

A related challenge to the above-mentioned lack of academic programs and of training is the lack of publications in general but especially translated into other

[115] PR college education is not limited to the major public university –the UPR and its eleven campuses. There are many others, such as the University of Sagrado Corazón which began as a college in 1935. Then, Sagrado Corazón in December of 1976 used the name of University of Sagrado Corazón for the first time. In 1985 this institution conferred the first three graduate programs for master level (Sagrado Corazón website 2005). Other universities in PR began around the year 1949, such as the Ana González de Méndez College, also named the "PR High School of Commerce" in Río Piedras. This institution name was changed to "PR Junior College" (PRJC) and it was in 1991 when this institution was called Sistema Universitario Ana G Méndez (SUAGM). In 1988, it began to confer graduate level degrees. In 1990 the school for environmental issues originated at this university (SUAGM website 2005).

languages other than Spanish in mainstream US and world-wide journals. In order to explain this challenge, there is an important difference to establish between the PR university system and its idea of advancement and the US one.

Research, publishing, teaching, mentoring and collaboration, for example, are very much tied to the idea of advancement in a US higher education academic institution. Since SG is an idea that originated in the US, research is one of its core goals and very closely bound to the idea of advancement in a tenure-track academic profession; I therefore need to examine the difference in the practice of research in PR to position the Puerto Rico program and agents on this practice. Research as an idea, or perhaps as the engine for the production of knowledge, is shared by both the US and PR; however, the US idea of a successful researcher integrates teaching at a college level, the mentoring of students, the production of research, the publication of a certain a number of articles and book(s) per year, the maintenance of academic collaborations and the presentation of work in academic events. The ease and ability of accomplishing many of these aspects of research in the US highlights the difference between countries like PR and developed countries such as the United States. In PR and inside the UPR system, research becomes a ‘loose’ concept and how professional practice research and acquire tenure seems not be analogous to the patterns in the US. In fact, it seems that the mechanisms to monitor professionals in tenure-track positions in PR institutions can be less rigorous than in the US. For example, tenure-track or tenure professors in the UPR system seem not necessarily committed to publish a specific number of articles per year or per number of years or to focus on their research, rather have a massive list of responsibilities having teaching as top priority followed by research, but also mentoring and writing.

The Unspoken Significance of Changes: UPR and Sea Grant

Two examples of the silences[116] and gaps[117] inside the Puerto Rico Sea Grant program are: the transfer of Sea Grant from Humacao to Mayagüez and the demotion of one of the agents as a result of the agent's actions of claiming to conserve the marine and coastal resources. Both of these examples can be categorized as caused by the political climate. During the end of the 1970s when the UPR Humacao launched the Sea Grant project in the east side of the island, Vieqües, a 'municipio', was experiencing major conflicts surrounding fishermens' rights. As it is described by a number of interviewees, the SG program began to give attention and to put efforts to these coastal issues related to Vieqües and the fishermen rights, but at the same a change at the UPR president-level occurred and the program transferred from one campus to another --from the east to the west. The explanation the various informants describe is that Vieqües was too political for agents to manage in academia, etc.

A second example is the demotion of one of the agents who was threatened by people at the government agencies due to the nature of the agent's work in the coastal zone. The respondent, a staff member who has been active primarily as an extension agent in the program for more than seven years, obtained an MA in the United States. This respondent has been in various positions such as administrator, agent, extension leader, interim director, and associate director. I quote at length, for the anecdote

[116] By silences I refer to those comments that were not verbalized but implied many times in the oral history phase.

[117] Gaps in this section refer to the 'arbitrary changes' that happen as a result of Puerto Rico Sea Grant as any other organization being part of a system that sometimes makes changes with no consultation or negotiation processes involved.

illustrate some of the silences and gaps that I have not touched upon in detail in this paper, though they are affecting marine extension agents' work in the PR program.[118]

> Related to a campaign with information about lifeguards back in the 1990s I had a problem with someone in the Department of Natural Resources. The government official described that I had something against him personally. I explained to him that I did not have anything against him. I am trying to suggest that if you have more lifeguards in PR beaches then you can prevent the occurrence of a high number of deaths per year. I want you to have more lifeguards since now beaches must count with them as part of the new structure…and certify them as well as to give the adequate facilities to create the best environment for people to enjoy the beaches. Then the guy called me and threatens me that he was going to call to Washington DC to kick me out of my position. We had a conflict. Then he called the chancellor of the time and they demoted me instead of kicking me out of the program.
>
> I said to him that it is fine, I am fine with whatever position I have because that will not impede me to say what I need to say. …Here in PR we have … serious problems related to the politicians and developers using the 'environmentally friendly' vocabulary like ecotourism, sustainability and they want to lie to us about their projects to benefit themselves.
>
> At the government level, one of the major barriers is to find a strong political climate that determines who will appointed in what position. Not only at the lower level but also at the Director level like in the Planning Board, Department of Natural Resources, Environmental Quality Board. Typically, people have been appointed to these important positions with no background or commitment and to end their personal financial debts.[119]

First, the interviewee mentioned a personal experience that resulted from her recommendations to improve the beach management of the island. Then, the interviewee described the macro-level problems: the continuous and resolute political power in the island which determines the course of marine and coastal affairs. A political power that may not be informed, professionally trained on natural resource management and/or coastal and marine management and who is not committed to find the best management

[118]Seven years is the average of agents staying in the program (see section titled *The UPR System: Operations of the University-Partnership for Extension*). Typically, someone who stays more than seven years has been in the program for at least 15 years.
[119] Interview transcript 008

decisions for the natural resources of the island is in a position of power to make decisions regarding marine and coastal resources.

This paper can only signal these silences or gaps because of the complex nature of this topic. I can suggest, however, that the silences or gaps that exist in the Puerto Rico program relate to the patronizing politics of knowledge.[120] There have been several instances throughout the paper in which this topic was discussed.[121] Analyzing one of the key definitions of marine extension in Sea Grant concerning extension work, one can see that actors occupy very uneven positions with respect to knowledge, and its production. According to the most recent extension handbook published by Sea Grant, "Extension work entails designing activities that effect behavior change through constituent driven programs…." Who are the primary targets of change in this definition? Industry? Government? Locals? A detailed examination of who have been the clientele of Puerto Rico Sea Grant and of the power relations among these groups would be an urgent and appropriate topic for graduate level study, or some other sort of future research.

The Exercise of Extension Work: Oral History Findings

This is the third "challenge" area mentioned earlier on the introduction of this chapter. This section highlights the fact that you are examining challenges faced within extension programming. Present challenges for the island's extension programming as described in this exploratory study included a lack of publications and a lack of incentives in general --more specifically, agents within the UPR tend to receive low-paying salaries and have no clear pathway to a tenure-track position This is one of the

[120] See chapter two section titled *The Politics of Knowledge Production In and Out the University* for more details. Michael Foucalt is taken as the major figure on the politics of knowledge.
[121] See chapters one, two, four and five for more details on politics of knowledge.

most critical issues for agents in PR and one that points to another challenge --a high-turnover rate for recruited agents. One of the respondents cheerfully said, "It is the worst paid-job but the one I remember had given me the most pleasure." Although there is enthusiasm in the general tone of the interviews, agents' voices were also affected by the burden of having very low paying salaries.[122] This is one of the most repeated limitations to the extension work and in fact, agents were often sad and anxious to mention this as a challenge. The person who stated the above quote defiantly explained how salaries influenced their decision to return or even re-consider the agent position after obtaining their PhD

> …first we have a high turnover rate and that basically means that we have not had the capacity to maintain our agents; therefore agents have come to the program and we have needed to recruit new people. I believe this situation -turnover- has created a problem because its not that the staff will be there forever, but at least we would have agents who would be able to develop in the program.[123]

First an advisor and today an agent, this person was born and raised in Puerto Rico. Passionate about the ocean and fishing, this person decided to pursue social sciences to integrate the sea and culture into marine and coastal management. The agent studied a BA in PR and a PhD in the United States, then decided to return to the island to work, and joined Puerto Rico program back in 1980s as a marine extension agent. During the time at Puerto Rico program moved from extension agent, administrative and research positions. The person worked for 20 years in the program and today still works in the program.

[122]See the section titled *The UPR system: Operations of the University-Partnership for Extension.*
[123] Interview transcript 003.

Extension work requires having a long-term vision to retain the agents and to follow extension programming. This quote suggests that as a result of the sum of other challenges affecting the extension program, it is also facing the problem of retention; few of the agents recruited foresee this as a permanent job. The high-turnover makes the practice and programming of extension face another set of issues: not being able to maintain and establish adequate rapport with Sea Grant clientele and the proper, persistent pursuit of solving marine and coastal issues that typically are long term conflicts.

Trade offs for Puerto Rico Agents: How Extension is Possible?

> I loved that job. The SG focal point at that time were fishermen…we used to called them artisanal fishermen. I believe today they are called commercial. To be honest, none of us as agents knew how to fish. We studied marine sciences but this was only a scientific outlook. We knew marine sciences as scientists. I thought that our place as marine advisor were not to teach these fishermen how to fish…I do not know how to fish….my advice on fishing was going to be out of place. Also, at that time the DNR, …and other conservation or government agencies were starting, and laws were to be established…well I began to try to get some trust from these fishermen…bit by bit I began by sitting with them and frequently talking to build rapport. I gradually obtained their trust. …Then, we divided the island in three geographical pieces for each agent.[124]

The marine advisor quoted above was born in Puerto Rico, obtained an MA in marine sciences in PR, and a PhD in the US. This advisor was one of the first extension agents in the beginning of the 1980s who work for about three years at the Puerto Rico Sea Grant and is not currently in the program. After training at Sea Grant, as for so many, the agent decided to stay in the US due to higher salaries and better conditions at the

[124]Interview transcript 015

workplace. “There are many things to do and many of them to document.”[125] Extension agents have to choose what tasks and what things to document and to do so they can achieve their goals.

In general, chapter four demonstrated the transformations in the work for Puerto Rico agents. It described in detail the challenges faced within the UPR system and extension work with less emphasis on the national office. In order to make further observations of the national office, further research must be done. For example, this study left open many unanswered questions like whether there is increased local autonomy at the SG programs and how the national office enforces, or not, standardized accountability measures to report the use of funding from the US Congress. A potential suggestion from this study, expanding on the Michigan piece, is that at some level there is national mandate that is enforced. For example, in this particular case Puerto Rico and Michigan Sea Grant programs’ list of topics, two local settings that are far apart from each other, can be parallel over many years or decades.[126] In sum, more research must be done to account each of the broader questions and study in detail the various aspects and challenges for extension work, like the ones presented on this chapter and on this thesis. This research can serve as a start and joint with new research can suggest applications to other local SG programs and even to other environmental programs.

Agents’ conditions of work are very complex; it is important to understand both the external and internal aspects of their job. The main argument of this study is to

[125]The agent in question, recruited in the end of 1990s, obtained a PhD in PR and still works in the program. The text is from Interview transcript 006. This quote shows the concept of accountability; a new word within federal government and any business or research or academic institution. Accountability is how one can ensure that the goals and actions can be accounted for or technically how one can document the means and the results of a program or project. Back in the 1970s and 1980s there was no concept of accountability as it is developed now in the end of 1990s and 2000 by the federal government.

[126]The PR study is part of a larger multi-site research study in which Puerto Rico and Michigan Sea Grants are compared.

emphasize that agents do not have a black and white position; they perform their work amidst many irregular and unstable circumstances. As they confidently declared, their job is possible aside from the many challenges they face, but as they confessed, there is much more to be done and there are insufficient human resources and/or funding to achieve current or future goals. They are also working within fields of expertise and economic practice that are changing in rapid and dramatic ways.

To best summarize how my informants' work histories revealed changes in work practices, it is useful to examine changes in the language used to describe extension work within Sea Grant over time.[127] Marine agents were named advisors back in the 1960s until mid 1980/1990s in the US. In PR, the transition from the use of the word advisor to agent happened sometime in the 1990s when the SG program experienced a re-organization of the extension program relative to communications and education. Changes in language bring about and reflect new sets of ideas, responsibilities and skills for the job. In this case we do see a change over time in the complexity and the multi-tasking nature of the work.

The above-mentioned quote made by an advisor echoes another made by an agent at the end of the 1990s.[128] Such quotes, selected from many similar narratives in my notes, indicate significant changes in work conditions and altered responsibilities for marine agents in PR over time. These changes appear to be along two main axes. First, the changes are making extension workers more and more formally responsible for

[127]In PR, most staff still say "agent" although "educator" is the new term in circulation now across programs. Changes in language bring about and reflect new sets of ideas, responsibilities and skills for the job. In this case we do see a change over time in the complexity and the multi-tasking nature of the work.

[128]Quote by *agent-Interview transcript 006:* "As an agent, I need to offer seminars, write newspaper articles, Puerto Rican Sea Grant bulletins, maintain an email list to stakeholders of current news, read and stay up to date in all business, work as a team, write routine reports, prepare flyers about extension activities, receive and give training, choose adequate strategies depending on the project/clientele, stay available for people, attend academic and professional events, and so on."

effecting changes in people's conceptions and practices in a politics of instruction ("education") rather than simply facilitating the flow of information and resources as "advisors" or "agents." Second, these processes link to the politics and practices of "accountability" that many of my interlocutors identified as new patterns within the U.S. federal government. They entail an increased frequency and set formulas for reporting professional accomplishments, an increase in the required amount of documentation, new ways to assess extension's success, and more frequent and formal evaluations both from internal and external levels. SG is increasingly incorporating such changes in work process across projects and programs. [129]

These agents showed a sense of pride as professionals, with "much to do [to research] and document." They do not consider themselves as merely advocates of or members of coastal communities; they seek to set themselves apart as professionals inside the SG proposal. This chapter presented the job description, work demands, agent's work ideals, and the practice of marine extension work, as well as an examination of how the conditions of their work have changed over time. The recruitment, the responsibilities and the expectations of the marine agents in the 1980s are not the same for those who were in the program the 1980s, compared to those who work today.

[129] I only signal the broader financial and cultural politics of accountability in this work as they have been pointed out by these respondents. Further work must be done in this area, drawing from the work of Marilyn Strathern (2000) and others cited in my introduction to this thesis.

Chapter Five-
Marine Agents, Extension Work, and Environmental Governance of Coasts

This exploratory recent historical analysis shows a clear need for strategies for more efficient development and deployment of marine extension agents; they are valuable resources which are yet to be fully exploited and integrated in the decision-making process of coastal and marine resource management. This is true not only in Puerto Rico (PR) but in other sites as well, as my ongoing research in Michigan is currently investigating. It is evident from the historical and the oral history phases of this exploratory study that marine agents can become important sources and producers of knowledge. Government, local, state and federal offices and environmental regulatory agencies must make adjustments to current permit procedures, as well, and attempt to expand the role of marine extension work in the decision making process for the environmental stewardship of natural resources.

As we have seen in previous chapters, marine extension agents in many ways enact the intersection of Sea Grant's (SG) broadest three-tier goals of research, commerce and environmental stewardship and the three-tier strategies of extension, research and education. Inside the Sea Grant program, agents enact the intersection between multiple goals and strategies in order to establish and maintain mediation and negotiation across coastal stakeholders. In doing so, they provide an alternative for better and more inclusive decision making and environmental management and policy by Sea Grant. Agents may be able to find the best solutions available to coastal and marine problems because they tackle them from multiple angles, assess the needs of stakeholders, provide the most up-to-date scientific information, create dialogue among those with various interests at stake, and produce unique, cross cutting forms of knowledge and to solve

management challenges. As a result, agents help multiple parties listen to one another, reach agreements, and make effective decisions.

This thesis described in a condensed manner four chapters that included topics, issues and research findings that have set the ground for a closing fifth chapter that could present much more specific remarks relative to the marine extension and Sea Grant. Each of the chapters built the framework and the background for the closing observations that will be made in this chapter. For example, in chapter one, entitled ***Forging Alliances in Rapidly Changing Coastal Worlds, Marine Extension,*** I briefly describe the intricacies of natural resource management in coastal settings, which is the focus of this research study. The complexity of natural resource management is raised in light of the significance roles (tourism, retirement, trade, etc) coasts play in today's society and the possibility that marine extension work can become an alternative or a solution to conflicts among coastal stakeholders. Extension can, I argue, be a key to facing and overcoming the existing and demanding challenges for natural resource management in general. In chapter two, entitled ***A Brief History of Sea Grant: From the US Environmental Movement,*** I present the environmental organization or framework that this study examines --the Sea Grant. The research approach taken to examine the recent history was from a broad and much global focus to a much narrower one from Sea Grant model to marine extension agents. Therefore, inside the national Sea Grant structure there is an examination of one of its local offices -Puerto Rico and its interaction with the Sea Grant national model and its extension component. Chapter three, entitled ***Puerto Rico: A Microcosm of Plural Coastal Worlds,*** explores how the broader framework -Sea Grant- is embedded into a local context Puerto Rico. The heart of this research work is the

findings from interviews and observations. These are explained in chapter four, entitled ***Marine Extension Work History: Local Autonomy versus US National Mandate.*** This chapter sets the stage for how extension is conceptualized as the focus of the study. Agents are depicted through a series of topics that gives us a contextual picture of the philosophy, the ideal views, the practice, the challenges and the interaction of one local Sea Grant program and the national office in marine extension and coastal management and tourism.

Chapter four also introduces the Puerto Rico Sea Grant Program and the agent's job, and some of the problems and issues agents face, concluding that agents are producers of knowledge rather than mere messengers. After examining agents' voices and discussing the challenges of marine extension, I am able to move onto drawing broader conclusions from the collected archival and oral material. I would like to focus on stimulating a discussion of *points of connection* that are suggested by the oral interviews and the archival work.

Though this work has identified several key structural and historical tensions in the roles of extension agents, it also offers recommendations as a valuable product of the study. This chapter has three major sections that will be developed next: **Broader Issues in Coastal Management and Extension Work**; **Puerto Rico Local Context: Potential Areas for Examination;** and **Shared Issues in Coastal Management and Extension Work**. This closing chapter will not only synthesize conclusions from the data gleaned from the semi-structured in-depth interviews, but will also draw observations about how the marine extension program might be altered for greater benefits for agents, those who

work with them, and enhancing environmental stewardship of marine and coastal resources as a whole.

In this study, findings suggest as one repeated observation that social and communicational skills greatly aid agents in accomplishing their jobs successfully, both related to agents' own ideal views and extension practices. These interviewees emphasized this set of social and communication skills to be critical for 'extension' work. However, the SG extension handbooks do not list social and communicational skills as primary sets of skills. The SG handbooks focus primarily on extension's relation to research from a delivery perspective. The disjuncture can be best explained by the history and the relationship between research and extension. The relationship between extension and research emerges, in part, from the history of extension work I have presented in this research work: extension was born in the early and mid 1900s from the Land Grant programs funded by the US federal government. The Land Grant program goals were primarily to better disseminate scientific and technical agricultural or land-based knowledge to rural communities and farmers.

The heavy emphasis on research has always dominated extension's position over others in Land Grant; Sea Grant does not seem to have changed this notion. Similar to Land Grant, Sea Grant extension today reflects this history and illustrates the research and extension delivery connection. On the other hand, this historical analysis study data suggests that there is tension between the ideal views and the practice of extension agents as they consider their work as mediators, translators, producers of knowledge and facilitators for the pursuit of the vision and mission of the Sea Grant. Agents were not considered to be only professionals who disseminate scientific information and educate

coastal stakeholders but these participants expressed a deeper and more complex job mission. These Puerto Rican voices advocate for the role of ethnographic observations and historical analysis in crafting policy change within the SG to better address and develop extension work. According to SG handbooks and its general overview, extension agents are seen primarily as messengers rather than as producers or sources of knowledge; yet, this study suggests that agents think of themselves and are envisioned in Puerto Rico as valid and valuable producers and sources of various types of knowledge and with the ability and the capacity of a much more comprehensive role inside natural resource management, applied research and extension.

These are relevant claims that conflict with the National Sea Grant and with the general extension model, and thus lead me to consider some of the limitations of this study. This is a research project that involved a small sample of the total population of extension agents and Sea Grant professionals in Puerto Rico and in general in Sea Grant. Adequate and increased frequent funding as well as more extensive research would be needed to expand the scope of the study to be more representative, or to integrate a closer analysis of the various actors in extension from coastal communities to the outreach staff from Sea Grant.[130] Also, although this study scope is small, I am attempting to examine a large and complex institution, thereby leading to some unavoidable omissions on my part. Despite the limitations, this study has produced important information related to Sea

[130] The 27 potential respondents whom I categorized as Puerto Rico agents were those included in one of the following groups: agricultural/marine advisors, marine advisors and marine agents in PR and USVI, half-time agents, new coastal community development agent and UNESCO agent. I interviewed seven respondents out of the 27 count for the population which is a fourth of the population. I interviewed all the directors. I interviewed two out of four potential extension leaders. I interviewed two of the potential four staff from education. I interviewed one out four potential communications coordinator. I interviewed three community leaders who worked closely to the Puerto Rico marine extension program; I have no exact number of the potential Puerto Rican organizations that could have applied to this category. I contacted and worked with one of the two potential information specialists who worked in the program.

Grant marine extension recent history. In fact, since this is a qualitative rather than a quantitative study, a more descriptive and richer outlook can be achieved that integrates historical, cultural and other contextual or power dynamics aspects. Finally and not less significant, studying PR marine agents in depth is a project that has not been undertaken before; in fact, the study of marine agents in general is rare. Looking at Puerto Rican marine agents allows this study to break new ground in terms of its nature and subject in the Puerto Rican context, marine extension and its role inside the natural resource management and environment fields.

Broader Issues in Coastal Management and Extension Work

This recent history (or historical analysis) has delineated some overarching issues related to coastal management and marine extension that are beyond the scope of Puerto Rico and Sea Grant. For example, four broader areas were categorized to outline the major points of connections taken from the interviews or voices: 1-daily operations of marine agents as the atypical nature of the job and the task variety; 2-using social and communication skills to become successful agents versus Sea Grant's handbook delivery interaction between research and extension; 3-lack of formal academic training and 4-the low paying salaries based on demanding job requirements and responsibilities.[131]

[131] The last two broader issues are well-described in the subsequent section in the context of Puerto Rico local issues.

Each of these broader areas will be discussed in more detail in this section of the chapter followed by a subsequent section on related local challenges for Puerto Rico Sea Grant Program.

Broader Issues in Coastal Management and Extension Work	**Local Puerto Rico Issues in Coastal Management and Extension Work**
1-Atypical nature of the job and the changing and more demanding or increased number of tasks and its variety that makes difficult the positioning and understanding of agents in natural resource management.	1- Changing recruitment requirements over time that tries to search for better prepared agents. The question is whether the changing requirements are supported by academic graduate level programs or other training opportunities for Sea Grant marine extension.
2-Envisioning and using more social and communication skills to view and perceive how this set of skills better prepared as a potential successful agent versus Sea Grant's handbook or vision where the delivery interaction between research and extension is the focus.	2-High-turnover overtime of agents is a fact in this program. Agents only stay for at least four to seven years and do not envision growing in their career inside their extension position because of the conditions embedded in this atypical job.
3-Lack of formal academic training in marine extension and the interdisciplinary focus needed to provide not only science and research training but social sciences and natural resource management training to be better prepared for their job.	3- Lack of publications or its academic journal publishing apparatus inside the island for researchers and extension professionals to grow in their day to day work.
4-Low paying salaries based on an increased difficulty making it a more challenging and demanding job with higher expectations in terms of requirements and responsibilities of its position.	

The first broader issue is that the SG agents do not have a regular monthly or annual routine. The atypical nature of the job and the demanding task variety of their position establish the idiosyncrasy of marine extension work. For instance, as we have seen Sea Grant's extension, and not education or research components, is the one that intersects and enables the three-tier goals and three-tier strategies to mediate, negotiate and make the final well-informed and non-advocate decisions among coastal stakeholders. The capacity to establish dialogue between Sea Grant goals and strategies allows agents to achieve the Sea Grant mission of having well-informed decision making processes guaranteeing better natural resource management practices and environmental stewardship.

The recent history of Puerto Rico marine extension program during 1980s-2000s is explained through the transformation and the change in status for extension professionals. For example, the change of the language use is one major transformation and/or change of status. One example of language use that creates change in status has been the transition from the term advisor to agent and/or outreach to extension professional. I will have more to say about this later.

Another example of the change in status is the increase number in job requirements and responsibilities for the agents in Puerto Rico.[132] It is the idea that now (and more so than in the past), agents are professionals striving to meet higher standards for all those who pursue Sea Grant extension work. In Puerto Rico, in the early 1980s when the program began and while obtaining the first Sea Grant project status, all eligible Puerto Rican agents were required to have an agricultural extension background. Whereas the second wave agents near this time then were required to have a Master's or

[132] The notion that these agents are embedded in audit cultures (Strathern 2000).

PhD in Marine Sciences. It was not until the end of 1980s that people with backgrounds in other disciplines, like the social sciences, coastal management, recreation and tourism, began to be considered for positions as extension agents. Finally, it was not until the end of 1990s that holding a PhD became a requirement for applying for a Puerto Rican extension agent job. Finally, it will not be until the most recent wave of recruited agents or by end of 1990s when having a PhD is common among almost all the agents.[133] Simultaneously, there was a series of changes in agent's status, expectations and responsibilities that went along this shifting scenario of requirements and responsibilities for extension. This changing environment is a clear example of the *professionalization* process of marine extension job over these two decades.[134]

The task variety and atypical nature of agents' implications raises also issues of governance inside the extension work as agents and extension programs and their relation to the national level. Having more responsibilities and higher professional requirements for agents, where other extension aspects are not changing, affects the main activities and the motivations or incentives that agents themselves pursue like becoming a non-advocate and having the capacity of seeing an issue from a multi-level view. The long-term product maybe the difficulty of retaining agents and thus of applying the Sea Grant model into other systems and areas like the government, industry, economy, community based models and academia. These negative products damage the role of extension can

[133] The agent's requirement in Puerto Rico Sea Grant does not correspond with the expected academic programs or with academic training in marine extension. The same comment can be made for some states in the United States.

[134] The *professionalization* concept or process is discussed in this chapter later in this section. The professionalization idea is coming from the politics of knowledge discussed in previous chapters in this thesis and the politics of accountability that are true in today's US federal government that is where the National Sea Grant and these local programs are located.

develop, when different than the other two Sea Grant education or research components, it has the capacity to apply the Sea Grant model.

The benefit of SG extension atypical nature is that it provides a multi-faceted approach that on its self is unusual to envision, pursue and attain inside the US federal government, academia and any other social system. It provides a much better sense of the complexity of a coastal management issues, stakeholders, implications and potential solutions using extension as the mediator and negotiator among such opposing forces. In fact, it allows the extension work to become accountable using a multi-level role of not only translating scientific knowledge into spoken language to general public, but also mediating among various stakeholders, assessing the needs of coastal stakeholders to present this at the local Sea Grant office for future implementation in its research agenda. Sea Grant's multi-level approach becomes a useful tool for examining today's complex reality and natural resource management.

A second broader issue in coastal management and extension is the gap between the voices of these agents claiming for using social and communicational skills being the most needed set of skills for an agent's success versus the Sea Grant extension understanding of other aspects or preparations. The National Sea Grant office statement on extension is described in the handbook *Fundamentals of a Sea Grant Extension Program* as using various delivery approaches. [135] The handbook and the Sea Grant view describe the role of an agent as having a much more translational definition rather than a producer of knowledge. In this sense, the voices of the Puerto Rican agents emphasized their definition in that it is not the 'practice' or the translational or delivery role of agents

[135] *Fundamentals of a Sea Grant Extension Program* is a recently published written marine extension handbook and the main piece of 'training for newly recruited agents' today in the Sea Grant Program.

what leads them to success or to build their rapport with the clientele but their social and communicational skills and whether coastal stakeholders gain a sense of trust. Trust is not something simple to develop for human interaction and is fundamental value for a group of people. Having a sense of trust on each other is central between agent-clientele; an agent cannot provide trust to their clientele in isolation or infrequently. Trust requires respect, time, repeated interaction, contact, attention and a double-way communication channel where there is an equal value on the participation of the two members. All human interaction is based primarily on trust and achieving the true meaning of this concept involve meeting specific characteristics like effective communication, listening, equal participation, value each other input and having a mutually beneficial relationship. The trust idea in extension or social and communicational skills does not seem to agree with what in general Sea Grant handbooks or statement portray. Therefore, this disjuncture may suggest the need for a closer examination to agent's views and those who work as agent's as a potential answer for determining a more comprehensive set of guidelines or preparation that builds on the understandings and experience of the agents and extension programs.

The difference in the conceptual definition of extension between the interviewee and Sea Grant extension handbooks is best explained using the idea of *professionalization* of jobs and the production of knowledge theories that are well supported by the field of cultural anthropology and on chapter two. The professionalization of jobs or the expectation of higher academic degrees or more set of skills required for a job is one way of transforming a regular job into a professional one. The production of knowledge theory, following Foucault's idea, explains that there are

different types of knowledge available in our society with different values assigned to them. For example, in the US society, or even in general in the modern and contemporary society, the scientific knowledge is highly valued compared to local or native knowledge. This second broader issue is examined with two theories from cultural anthropology as they have been constantly used in dialogue. First, Foucalt's theory that explains that there are higher values assigned to particular types of knowledge, for example to scientific knowledge and male knowledge.

A combination of various contextual aspects such as culture, individual thought and other social dynamics forms the capacity to add value. The assignation of higher values to particular types of knowledge comes along with power dynamics that are also tied to social context. Second, the *professionalization* idea or process explains that there is a criterion that distinguishes a job position (i.e., between a regular job and a professional one). For example, it can be argued that one of the major differences between a job and a professional job is the nature of being a more academic or involving thought exercises or education versus a more technical or skilled job position. These two theories are combined since the assignation of values to particular types of knowledge is closely tied to the professional or technical divide and the other a difference on types of jobs (technical versus professional) in our 'modern' and contemporary world. Therefore, for example a male and scientific knowledge receives a higher value than a feminized local or folk knowledge.

The connection of these theories and this research is that extension work was transformed from 1980-2000 into a professional job and still today confronts many of the challenges that are tied to not having a high value added or the accountability that a

scientific or professional job may have. In other words, the agent has acquired scientific knowledge and also has become a professional without the recognition of the value added to both characteristics.

In fact, this argument is well-supported by the disjuncture between participants voices and their idea of social and communication skills set being most important for an agent's success rather than the SG handbook delivery view. Moreover, the Sea Grant program transformation over time shown that both a change of status through language use differentiating from an advisor to agent with increased higher academic standards or requirements and the increased number of responsibilities for extension professionals. Furthermore, this program transformation has not happen in isolation; it is embedded into a much more complex context and environment, where research, conservation and commerce, the three tier agendas merge altogether under SG name. It is this contextual environment the stage where the politics of knowledge take place and determine what knowledge is considered to have a higher value than another and how the agents conciliate some forms of these theories.

The concept of "feminization" of a particular role or knowledge form can complement the above-mentioned ideas about the politics of knowledge, professionalization, and the assignment of values to particular types of knowledge. It is the final component of this series of critical background concepts to understand the value placement for extension and marine extension agents during the decades of 1980s until the present.

Mary Catherine Bateson's (1990) theories about gender and productivity and work builds on and contributes to a long line of thinking about how most societies see

assign a lower value to those activities done by women. Moreover, women's position in our society is used to explain that in general there are certain activities, tasks or roles that receive an under value and yet they are needed for the infrastructure of our society to develop. She describes that women have positions that are not socially validated and silenced but yet are necessary for the world to run efficiently. She focuses on how women have traditionally served roles in which their work provides a foundation for the development of and communication between various units of society. Furthermore, she notes that women have the ability to accomplish a number of tasks for the various units of society to develop and communicate. She argues that such skills can and should become increasingly valued in "new" economies that value expertise, training, and communication rather than the skills of industrial production such as standardized assembly work.

Like women have traditionally done, marine extension agents facilitate the establishment of relationships, act as conservers insofar as they hold onto skills and relationships that may be recycled at a later date, and act communally, rather than competitively. For instance, in order to understand how women 'hold onto skills and relationships' they combine different tasks act communally, feeding each other instead of competing with one another (Bateson 1990:234). Agents many times can be devalued because they are seen as serving a "feminized" role, i.e., as facilitators rather than actors, as communicators or translators of scientific knowledge into spoken language rather than producers of knowledge. Bateson theory allows forging a connection between a study of women's traditional and undervalued roles within a patriarchal society and how agents receive a similar place in environmental stewardship and natural resource management.

There are a number of examples that are evidence to suggest that agents are perceived as having "feminine/feminized" by the public, managers and others. For example, the most clear evidence is the 'translational or delivery role' that is envisioned from the national mandate. It is relevant to note that the delivery role is different and in conflict with the voices of these agents calling for 'better sets of social and communicational skills' determining the real difference on the performance as an agent and the interaction with coastal stakeholders. Another example is the contrast between agents and others who are producers of knowledge in the form of highly specific research science. Agents are more closely related in my respondents' views to "the soft" or social (and applied) sciences than to "hard" or biomedical and biological research.

In addition, much of the work done by agents for the period under study is not collected in reporting or accounting as part of their job; thus, these non-accountable activities are the clear link to the social and communicational skills said to be much needed to be successful in this job. Finally, the fear or the lack of support for how extension is forming something new that there is not a fit into today's 'specialized research agenda' or by the Sea Grant local or national programs. Agents and the natural environment, like women, have played in general an undervalued role in our society. For instance, agents have a number of tasks that in academia are not praised, respected, or seen as "scientific" as compared to those that researchers or tenure-track faculty members in research universities may have.

Some of the tasks that allow for firmer ground for a connection to Bateson where in which agents are perceived as underpowered/unimportant/feminized include establishing a two-way channel of communication, identifying all stakeholder's needs,

and working in the field mainly with qualitative and observational data. Historically agents are seen as mediators or information-transfer channels and are not thought to be producers of knowledge. Bateson connection is that agents are seen not as powerful actors but as passive mediators. Because perceived as fundamentally passive, rather than active, agents assume the same position that women have traditionally held.

The undervalued position of agents will be only signaled in this essay is how the marine agents can be reproduced in our world having many feminized qualities as Bateson (1990) describes in detail on her book *Composing a life*. The undervalued, or "feminized", position idea comes from Bateson discussion of how there are jobs, types of activities that will resembles the various values and types of knowledge and how they interact in our society. This idea is addressed in consideration that a more thorough examination of extension agents as having a "feminized" role or position is needed vis a vis the highly hierarchical and historically male dominated world of scientific research; this theme is beyond the scope of this essay. However, there are clear resonances in this exploratory research work and the relation of agents as having a feminized role and contemporary debates about gender, labor, multitasking, various forms and productions of knowledge, social status, and how to measure or value productivity or accountability. It is a fact that much recent business management literature calls for a valuation of classically "female" roles such as one on one mentoring, multitasking, non-profit or measurable activities but this essay will simply signal this topic as possibly future areas of interest for further research and reflection.

The third and fourth broader issues, lack of academic training and low paying salaries, related to coastal management and extension directly link to this last issue.

These two issues are drawn from the PR context so the following section in this chapter will have a thorough description of them. For this section, these two broader issues are closely tied to the one in discussion and the most important one –the relation of Foucalt and Bateson's theories. The lack of academic programs in marine extension is not happening in isolation. Still today, the difficulty to recruit personnel with extension preparation is a major challenge not only in Puerto Rico. Extension in general is well-built into the agricultural framework developed by Land Grant and it seems there has not been a move to the marine extension in academia or education or training inside the United States. The low paying salaries are true in that new demands and responsibilities have been given to extension agents without clear or new incentives. For example, they are required to use to advanced technology, to do more reporting and documenting, grant-writing, and even in general more clerical work as they rely more on computers and other technology and yet their salaries or compensations has not dramatically changed correspondingly.

The implications of these four broader issues are that agent's are undervalued and feminized in ways that foster conflicting understandings of what is extension, how it is done, how to provide adequate funding both at the local and national level. These issues may also play a role in the lack of examination and evaluation or assessment on how successful and efficient this 'model' can be in this context for natural resource management but also for other systems or areas like research or education. These are all major and possibly negative implications for the current state and future development of extension as an unusual area inside Sea Grant and as a model for other systems or fields to consider.

What is most striking is that the multidisciplinary, interdisciplinary and beyond these two the craft of something new, or transdisciplinary, that is natural to extension is where many things are moving today (i.e., in academia) and in the assessment of today's society. It would be fatal to misread the success of extension and lose the importance or value of this 'innovative and comprehensive Sea Grant component'.

This brings me to a strong suggestion that re-evaluation and providing empowerment to the 'undervalued' marine agent within society and the SG program in these findings. Agents need to be empowered. They are all -the designers, actors and channels- for many activities in natural resource management and in extension work. Agents may not feel supported and see their careers as lacking a secure track of personal and professional development in Puerto Rico; this unsure status can lead them to abandon their positions easily for other jobs and raises the issue of lack of continuity which is so imperative in natural resource management. Better retention of agents would enhance the process and growth of marine extension programs, as well as provide them with long-term vision, planning and implementation. Better retention can be pursued maybe not with monetary incentives since there are major barriers linked to funding and the ability to increase the budget but may be providing for training and additional professional career development can be alternatives. Some suggestions are establishing a much more cohesive sense of extension program where collaboration and agents training each other is natural to the local program; this strategy can ease and facilitate the national collaboration as well in that if a local program knows their staff it is not one person but a team of people acting as 'networkers' when national events like Sea Grant Week happens. Also, guaranteeing a tenure-track position while securing agents from Sea Grant

at the university level, providing the chance to pursue higher degrees using some of the resources available in Sea Grant and the chance of using their atypical job to form new groups of transdisciplinary research projects possibly may become appropriate in the next decade as this is major tendency in academia at the time. Having these incentives can reduce turnovers in agents' position and assure the continuity needed in natural resource management as well as the agent's individual satisfaction with their work environment and their capacity of growth inside the Sea Grant.

The job requirements of outreach and people skills -- and not necessarily relative to professional expertise -- need to be better valorized by the program. The job of the agent requires skills such as outreach and people skills (e.g., communicational, translational, gestures, caring for stakeholders). The idea is how to develop internal or administrative strategies in Sea Grant to better valorize these non-technical or academic skills that are critical for marine extension work is the challenge. Some strategies are to begin to educate through forums, dialogues or to brief Sea Grant staff and other university colleagues about extension, marine extension and its value compared, for instance, to highly valued activities such as research. Also, other recommendations are to actively promote how scientific knowledge and other types of knowledge are equally important inside environmental stewardship and management.

Puerto Rico Local Context: Potential Areas for Examination

This section on the local context of Puerto Rico aims to address local challenges that may become critical to other Sea Grant College programs or other entities.[136] This

[136] The section titled *The Practice [or Challenges] of Marine Extension Agents* in chapter four lists the challenges for marine agents in PR In addition, changes in local environmental policy or laws and, in the

piece was not included in the previous section as it is using the findings and the data collected to make observations regarding the Puerto Rico local context. There is a list of major challenges discussed briefly here: recruitment requirements, high-turnover, and lack of publications.

The combination of these local elements embedded in the local context –Puerto Rico- makes the work of a marine extension agent a demanding, stressful and urgent matter; even with a marine extension program in countries like the islands or in the Caribbean, the marine and coastal resources are threatened in rapid ways that we have never faced before and thus may lead us to lose these valuable resources. These major challenges were frequently repeated by the participants of this exploratory study; thus becomes relevant that the concluding remarks focused on them and mentioned the potential contributions that this work make in the description and the positioning of marine extension work inside Sea Grant, in Puerto Rico and within the marine resource management.

The previous section contextualizes the major theoretical frameworks embedded in this exploratory and historical analysis of the Puerto Rican marine agents that can possibly have impact in other Sea Grants and other institutions. This section will locate specific examples of these theories and apply them to the Puerto Rico Sea Grant.

The local challenges in Puerto Rico for Sea Grant project functioning and management include difficult recruitment requirements, high-turnover, low-paying

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case of Puerto Rico as a US territory, federal laws about environment and their corresponding environmental agencies are other aspects that affect marine extension transformation. Providing forums or dialogues between the staff of local environmental agencies and environmental federal agencies can result in effective spaces for communication, delegation of tasks and responsibilities, enforcement and regulation and education to the public.

salaries, and lack of publications by personnel. These and other difficulties can be summarized into three major categories for the purposes of my analysis, and in order to support specific recommendations. These categories include recruitment, positioning inside the Sea Grant- University partnership structure, and contextual elements of locating the program in Puerto Rico or in the Caribbean (i.e., social, environmental, political and other aspects).

The first category, pertaining to recruitment, involves staffing dynamics and includes recruitment requirements, low-paying salaries[137] and high turnover.[138] The second category, or the positioning inside the university partnership, consist of the PR Sea Grant's incapacity to fulfill Sea Grant national office mandates on research in terms of the budget allocation, the unique positioning inside the UPR (relative to many other Sea Grant contexts), and the relative lack of publications. The contextual or local elements are those aspects that are intrinsic to the geography of this locality at various levels (i.e., social, political, economical, environmental, etc). One of the most evidenced and repeated example of this third category is the threat, or the intense pressure on marine and coastal resources. This last example will be used to examine the final category. Each of these categories will be discussed in detail in light of the theoretical frameworks discussed in the previous section.

The recruitment category is most affected by the politics of knowledge and the practice of science in Puerto Rico, but also more broadly in the Latin American and the

[137] Low paying salaries were mentioned in detail in the previous section as the resources in general not only in Puerto Rico are becoming less and less over time. Also, there can be an assumption that low paying salaries alone cannot make a person leave a job. This study suggests that a low paying salary possibly was a major factor that pushed many of the agents to leave with no possibility of returning to this position based on their credentials and change of status after leaving this job.

[138] There has been only a few cases in general who have stayed as agents over time and typically those who stayed longer periods of time where not only agents but extension leaders, administrators and there has been only one person who have stay only as agent from all recruited agents.

Caribbean regions. Unlike the US, but similar to many other Latin American and foreign countries, Puerto Rico lacks a strong research apparatus or culture Scientific work and research is conceptualized and practiced in PR in ways that reflect significant differences when compared to a country like the US; For instance, the US places an economical and cultural value added to concepts such as science and research as they inform broader domains of economic production and expertise with respect to environmental management broadly, and coastal management in particular. This state of affairs imposes great barriers to a program like Puerto Rico Sea Grant in that it competes at the budget level with another 31 offices that may not face the same constraints.

The recruitment challenges do not occur in isolation but are embedded in the odd positioning of PR within the broader national Sea Grant Program; in other words the second one becomes the context for the first one. Indeed the atypical position of the program inside the national university partnership initiative, and of marine extension work itself within broader approaches to marine resource management all exemplify nested power relations. These can be seen through a lens of feminization, as with Bateson's depiction of the role that women play in society as multi-taskers and mediators across multiple spheres. This work suggests that such a vision can correspond to the role that marine agents occupy in Sea Grant, or within natural resource management more broadly. They carry out work that is vital to the functioning of complex systems, and to the perpetuation of the system, but which is also undervalued relative to the more dominant and competitive practices of scientific research or commerce.

On a more immediate institutional level, the lack of an academic research apparatus and the strong extension and not research component hinders Puerto Rico's

role within the national Sea Grant Network. Moreover, my research has shown that the US society places higher value research without linking directly to the extension component.[139]

Shared Issues in Coastal Management and Extension Work

There are several issues that cut across the broad domains of coastal management and marine extension that can be summarized from this study.[140] The highlighted shared issues are: specific program incapacity to achieve the Sea Grant NOAA mandate for research budget allocation, the odd positioning of Sea Grant local programs and the national office inside NOAA and DOC and local environmental and social dynamics such as the existing intense pressures on coastal and marine resources worldwide. These cross-cutting issues can be defined in various ways: local versus national, Puerto Rico versus the US and other foreign countries and Sea Grant versus other environmental programs.

The first issue is the incapacity to allocate the mandated research budget. This issue became a repeated topic of discussion during this exploratory study. Participants typically refer to a period in the 1980s, for example, that Puerto Rico's research proposals were "approved but not funded".[141] Moreover, other programs as well as Michigan Sea Grant are other examples inside the Sea Grant Network that face the same challenge.[142]

[139] There were a number of comments as well as the archival work phase showed that many times the monthly bulletins and other ordinary Puerto Rico Sea Grant were not happening as frequent or in a timely manner as they used in the earlier years. The suggestion is to make a priority these publications since it is one way of building the research infrastructure that is so valuable at the US national level.
[140] This section is still a work in progress since these are shared issues that have been signaled as a result of my subsequent work in Michigan Sea Grant and the national office. It is important to include mention of this in this Puerto Rico thesis and in the conclusions, to show how local issues can potentially become cross cutting ones.
[141] A number of interviewees repeated the same situation such as 002, 003, 008.
[142] Moreover, a similar situation occurs at other SG local programs, after the Biennial Reports from the end of 1990s published by the National office were revised; the situation is the incapacity to fulfill this research

Many times the local SG programs having to invest the budget in a particular distribution seemed to enhance the extension program, and not the research in the Puerto Rico Sea Grant, which seems paradoxical when research has been the primary focus of attention in the Sea Grant model.[143]

The second shared issue is having a unique positioning within the Sea Grant model, which is reflected at various levels: Sea Grant inside DOC and NOAA; the national office inside NOAA; the local SG programs inside the university-partnerships, and the marine agents inside their university-partnerships. This atypical position only adds to the confusion and possibly to the assignation of a lower value to marine extension and agents for the kind of work they do. But more than describing the atypical feature of extension within Sea Grant overall, the real matter and urgency becomes the resulting negative outcomes that comes along with this positioning. Many times the odd positioning greatly affects the overall achievement of SG's mission goals and practices, raising clear limitations on the ultimate statement of marine extension –that is agents of change.[144] These limitations can be detrimental to the completion of the Sea Grant model. In chapter four a series of alternatives to address these challenges were listed but for now the major idea is that the solutions is to increase awareness by the public about the Sea

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mandate –one of these programs being the other program under examination for this research project – Michigan Sea Grant.

[143] In this exploratory study, there was a general common sense from the interviews that extension in the Puerto Rico Sea Grant was by far the best component that this program had. This is not to imply that Puerto Rico justify allocating more money to extension; in fact, Puerto Rico's budget distribution for 2001 as reported in the FY 2001 Sea Grant External Funding Table is that 50% was invested in research and 21% for extension (National Sea Grant Office, n.d.).

[144]Some examples for the odd positioning of the marine extension agents are: delays decision making to happen from regular paperwork to appointments of jobs, the distribution and the organization or structure of the Sea Grant programs and its management, the views, understandings and the practice of marine extension and the agent, etc

Grant model, especially the marine extension program, and the concerted effort of small changes at the administrative and practice levels in SG to better address local dynamics.

The third, and final cross cutting or shared category, is the local context, which is closely link to the previous two categories. This oral history, or ethnographic work, has illustrated that the local dynamics (i.e., social, economical, political and cultural) are to a great extent influenced and became strong factors to either contribute or prevent the Sea Grant model. For that reason, a close examination and understanding of the local dynamics can address and integrate the local context to the Sea Grant model and then result in a powerful tool for natural resource management. The most evident example of local dynamics is the intense pressure on abundant coastal and marine resources on an island ecosystem with one of the most rapid urban and coastal development of all times. It is this high pressure on these valuable and ecologically sensitive resources that many times, driven by particular interests over others, trigger negative consequences -or put these resources at stake. Understanding these local dynamics and the various interests on these natural resources can become the critical element to guarantee success over the application of a complex, multi-level model like Sea Grant, particularly in places with complicated histories and politics of knowledge as Puerto Rico, the Caribbean and the US

Future Research Areas

There is a need for a more thorough study of marine extension agents' role in natural resource management. This study showed that the notion of what agents represent are must be re-visited. Agents can be sources of fundamental and different types of knowledge. They have the skills to translate scientific information into spoken language

or perform informal education and to become mediators to various groups with different interests. Agents are multifaceted people with many skills who can facilitate the job of natural resource management and environmental policy. By recognizing the agent's *fluency* in tasks such as the establishment of dialogue among various types of knowledge, Sea Grant and environmental organizations can begin to make better use of agents. An option of the agent's expertise can become knowledge mapping. Mapping the various types of existing knowledge in a group in general, in a cultural group, in a country and/or area or region inside a country can help to understand power relations or the various existing types of knowledge and the assignation of values at various levels at social, economic, political level among coastal stakeholder's. This mapping of various types of knowledge may also illustrate the intersections of them. By knowing these new pieces of information about various types of knowledge and the assignation of values in a particular group, a researcher or any other professional working in different settings like the government, non-profit, research, academia, schools, health-related, and others can better understand environmental and ecological factors that may be affecting the social dynamics that are embedded into a particular locality. Also the various types of knowledge can raise questions about social class, race, ethnicity, identity, cultural identity as individuals or as a nation, politics of accountability, de-centralization, professionalization, education and professional development and public health that are dynamic and constantly changing and re-defined by all actors in our contemporary society.

Understanding the presence of power relations in current society is another way of exploring the existing power dynamics in our society. By developing strategies or

qualitative studies and/or using the social sciences much of these power dynamics can be better understood in relation to other influential areas like social, economical, cultural and value aspects, politics of knowledge and stakeholders relationships in a local context.

Concluding Remarks

Puerto Rico needs programs like SG in light of its pressing issues related to environmental stewardship, marine extension work, and coastal and marine resources. On one hand, Puerto Rico extension work in general is still in its beginning stages. Marine extension work as a career is new; marine-related and resource-management academic training and programs are minimally developed. On the other hand, issues related to coastal and marine resources are on the rise.[145] The pressure of increased numbers of people, coastal and urban development and the lack of management affects the conditions of natural resources, which are increasingly at risk. SG presents a program immersed in the intersections of the goals of commerce, conservation and research. Marine agents in SG need to mediate, manage, and create dialogue among the goals. In P.R., the marine agents from SG apparently are the only professionals who have the ability, skills, and job position to enact these goals and to have the extension position on the island. Although agents are threatened by an underdeveloped education system increasing constraints and demands on their work, and an ambivalent national imperative, agents are nevertheless faced with the enormous and critical task of coordinating and establishing dialogue among various stakeholders, public environmental institutions, and the government.

[145]See chapter three the section titled *Coastal and Urban Development: Puerto Rico's Rapid Growth* with a rich descriptions of environmental and urban development patterns of the island.

Epilogue- Rolling the Dice

> Hurricane Katrina changed New Orleans, Louisiana from a place fabled for revelry and music to one of flooding, misery and death. The huge storm also smashed coastal Mississippi and Alabama to the east of New Orleans. The severity of the destruction and the problems that arose in Katrina's wake has shaken previous notions of government planning and response to large-scale natural disasters. By Jeffrey Young Washington, DC. *16 September 2005 News VOA com*

Engineer Joe Schofer at Northwestern University, referring to Hurricane Katrina, argues that planning must include "risk management," which involves making tradeoffs between the likelihood and consequences of a major disaster. In New Orleans, Louisiana, it seems that this kind of planning was clearly not present when developing a city under sea level, and where many residents felt alienated from the economic and property development that occurred. This specific situation comes to be of enormous importance when the veneer of order breaks down and the linked environmental and social fault lines are exposed. The nightmare scenario of Katrina in New Orleans will not, with luck, ever apply to Puerto Rico. However, it illustrates how high the stakes can be in the complex social processes of planned coastal development.

Marine agents could have helped avoid the problems of a city like New Orleans from the beginning. On paper, marine agents are responsible for attending mainly to coastal and marine affairs; however, their position goes well beyond and includes the dialogue between potentially opposed interests as to how best to minimize risk and maximize opportunity for entire communities. In fact, marine agents could have served as mediators and non-advocate players when developing a city like New Orleans. Moreover, marine agents could have been useful in the preparation and evacuation of cities even

during and after the crisis because they have the skills to serve people and to present information effectively.

We cannot go back in time to the past, but we can look at history for its lessons for the present and future. The history of the Land Grant Program was one based primarily on extending the wonders of technical and scientific knowledge to those whose interventions in natural systems made them more productive for human needs. Today, we see natural systems in flux; fragile and at times threatened as productive systems due to the over-application of technologies for human use. The possibility of unpredictable and extreme events appears to be increasing. Valuable ecosystem based services such as water filtrations through coastal ecosystems are growing increasingly precious and rare. Such developments lead to increasing social contestation and demand greater and greater social consultation.

Katrina offered just another example of how useful and practical agent's position can be within coastal and marine resource management.

This study suggests that today's marine extension agents are facilitating such processes, as both primary sources and producers of valuable information –not only in Puerto Rico, but around the world. The tensions reflected in their roles are difficult to resolve, but will require ever more careful attention from political leadership, scientific experts, business communities, and those communities who have historically inhabited coastal areas, and who continue to use coastal resources for their subsistence in a rapidly changing world.

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