

### 3. Management, Assessment, and Institutional Commitment.

#### **Division of Responsibilities, Management Framework, and Research and Education Schedule.**

*Overall Management Plan:* Overall project management and assessment will reside at Old Dominion University. The Lead PI (Carpenter) will be responsible for management and execution of the project in close consultation with co-PI's and international Senior Personnel. The Lead PI will be responsible for overall coordination and oversight of the project including: 1) recruitment of ODU participants 2) management of field operations in Malaysia and the Philippines, and 3) coordination with Malaysian and Filipino partners. BU co-PI (Barber) will be responsible for: 1) coordination with the Diversity Project (see Educational Objectives), 2) recruitment of BU participants, 3) management of field operations in Indonesia, 4) coordination with Indonesian partners. Carpenter and Barber will coordinate preparation of participants and project members for field work in Indonesia, Malaysia, and the Philippines, including decisions and information about security issues (in consultation with U.S. Embassy officials in Indonesia, Malaysia, and the Philippines) and visa requirements. The Duke co-PI (Halpin) will be responsible for management and oversight of the marine geospatial modeling component of the project. Old Dominion University Research Foundation will be responsible for management of the grant under established rules and procedures.

The PI, co-PIs, and one senior investigator from each lead IMPA institution will make up the Advisory/ Evaluation Committee that will track project development and implementation with advice from the project evaluator (Burke). Upon notification of the award this committee will meet monthly for the first three months and then carry on quarterly meetings through Year 5 via Internet teleconferencing. The status of research and education regarding the thirteen project components described below will guide the meeting agenda for these meetings. Formative evaluation data addressing progress toward meeting project goals coming from project evaluation will be reviewed and acted upon during scheduled meetings. Changes proposed during the meeting will be posted on the project website for review and comment by all participants. Based upon the advisory committee's suggestions and participant comments changes will be implemented as appropriate within 30 days of each meeting.

The coordination of specific project components will be the responsibility of project personnel whose expertise also enables them to serve as resource persons. These are as follows (with primary responsible person listed first): 1) Research design & analyses: Barber, Carpenter, Ablan, Ambariyanto. 2) Microsatellites: Ablan, Starger, Manjaji. 3) DNA sequencing: Barber, Ravago-Gotanco, Juinio-Meñez. 4) Marine geospatial modeling: Halpin, Treml. 5) Undergraduate Education: Barber, Carpenter. 6) Graduate Education: Carpenter, Barber, Halpin, Post-docs. 7) Post-Doctoral Development and Mentoring: Carpenter, Barber, Halpin. 8) U.S. Peace Corps Volunteer involvement: Javillonar, Carpenter. 9) International Education & Development: Juinio-Meñez, Mohd Nor, Mahardika. 10) Conservation & resource management: Erdmann, Quiblan, Carpenter. 11) Field collections: Philippines: Juinio-Meñez, Labe, Carpenter, Javillonar. Malaysia: Manjaji, Yusuf, Mohd Nor. Indonesia: Erdmann, Ambaryanto, Toha, Marhardika, Alhakim. 12) Workshops, meetings, travel requirements & communications: Carpenter, Barber. 13) Project Evaluation: Burke, Carpenter, Barber.

Project evaluation will be the responsibility of an outside consultant, Daniel Burke, who is the Director of Graduate Studies in Computational Biology at New York University with many years of project evaluation experience. His work will be coordinated by Dave Blackburn, who is the Director of Program for Research and Evaluation in Public Schools at ODU's Darden College of Education.

*Timetable:* The timeline for project activities is listed in Table 2. Project consists of 4 years of research/education activities that is preceded by 6 months of field planning, cultural/language training, and general preparation of project personnel. Research/Education activities will then rotate through the Philippines, Indonesia, and Malaysia for one year, followed by a year where we rotate through all IMPA countries to complete any outstanding field or research objectives. The final 6 months will consist of data analysis and synthetic manuscript preparation and will conclude with a conference that will unite all project members and government officials from marine resource management agencies.

**Education/Management Framework.**

Postdoctoral Training: As postdoctoral students (Post-docs) have extensive research experience, but are developing their research programs, they are an essential component of our PIRE program. Three Post-docs will be supported each year, one each from ODU, BU, and Duke. BU and ODU Post-docs will in be residence in IMPA host countries during the four years of field/educational activities. The Duke Post-doc will participate in Training Workshops and field activities in IMPA countries, but will reside the remainder of the year at Duke where

the requisite computer resources are located. It is expected that Post-doc tenure will last 2.5 years, providing a total of 6 post-docs the opportunity to live and work in two countries and in the IMPA for 2 years. Post-docs will assist with Training Workshops, contribute to operational oversight of in country labs, will train and mentor U.S. and IMPA graduate students, and will lead field expeditions in collaboration with hosting IMPA scientists. It is expected that these experiences will lead to networks, linguistic and cultural abilities, and research interests to sustain independent research programs focused in IMPA countries. In addition, they will develop the educational, managerial, and mentoring skills required to successfully lead their own independent research laboratories upon completion of their Post-docs.

Invited Early Career Faculty: Two early career faculty will be invited during years 2 to 4 (6 total) to participate in the Training Workshops and related field activities. This will allow them to develop cultural and biological familiarity with the host country, build institutional contacts, and develop collaborative research activities within the IMPA countries. Early career faculty who have already agreed to participate are in the “List of Participants.” Early career faculty will provide additional technical expertise (particularly with microsatellites), additional mentoring during fieldwork, and can easily extend their research into IMPA countries, increasing the number of PI’s engaged in collaborations in the IMPA.

Graduate Training: Six graduate students per year (3 BU, 3 ODU) will be supported on this project and fall into two categories. *Senior Graduate Students* (1 BU, 1 ODU) will reside for the entire year in hosting IMPA countries alongside the postdoctoral students. In addition to participating in *Training Workshops* and field activities, these students will conduct molecular genetics research in the hosting IMPA laboratories alongside U.S. postdoctoral students and IMPA graduate students as part of their Ph.D. theses. *Senior Graduate Students* will mentor *Junior Graduate Students* in the field and will also mentor one IMPA graduate student each. *Junior Graduate Students* (2 BU, 2 ODU) will participate in *Training Workshops* and extended field activities in hosting IMPA countries. *Junior Graduate Students* will use their experiences to apprentice for subsequent involvement as *Senior Graduate Students* so that students living overseas for a year are linguistically, emotionally and culturally prepared for the experience. It is expected that *Junior Graduate Students* will develop thesis topics focused in IMPA countries whether or not they continue to the *Senior Graduate Student* stage. *Senior Graduate* students will initially come from existing students in the Barber and Carpenter labs who have previous experience in IMPA countries until *Junior Graduate Students* can be suitably apprenticed. It is anticipated that a minimum of 22 unique graduate students are engaged in our PIRE activities.

Undergraduate Education: Exposure to the biological and cultural diversity of the IMPA can be a life transforming experience, yet is an experience that is unavailable to most. With this in mind, “The Diversity Project” was started in summer of 2005 (<http://people.bu.edu/pbarber/Intro.htm>) as part of the CAREER grant to Barber. This program integrates population genetics research, mentoring, and cultural exchange while advancing our understanding of high biodiversity on the world’s most diverse coral reefs.

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<b>2008</b>											
Planning/Training					REU						
					Workshop						
					Philippines						
<b>2009</b>											
Planning/Training					REU						
					Workshop						
					Indonesia						
<b>2010</b>											
Planning/Training					REU						
					Workshop						
					Malaysia						
<b>2011</b>											
Planning/Training					Phil., Indo.		Conference Planning				
					REU						
					Workshop						
					Phil./Indo./Mal.						
<b>2012</b>											
Conference					Phil., Indo. Mal.		Final Conference				

**Table 2.** Timeline of PIRE activities.

Each year we will recruit (see below) 4 under-represented minority undergraduate students (16 total) to be integral members of our research expeditions. The 10-week program will begin with two weeks of field research in the IMPA where students will collect tissue samples. Upon the conclusion of field activities, PI's Carpenter and Barber and undergraduate students will return to begin genetic analyses at BU. Students will collect mitochondrial DNA sequence data, conduct computer based population genetic analyses, then summarize and present these results at the Boston University Undergraduate Research Symposium. Evaluation of The Diversity Project has been overwhelmingly positive.

**Strategies for Recruiting.** *Post-docs:* Potential startup Post-docs are already recruited and listed as participants for Boston University (Starger) and Duke (Trembl). ODU has identified several potential Post-docs, and active recruitment of these and other candidates by advertisements will begin upon notification of award through appropriate professional societies (e.g. American Society of Ichthyologists and Herpetologists) and society listservers (e.g. Evoldir). *Graduate Students:* Recruitment of graduate students will not be problematic since the laboratories of all three PI's have active graduate student programs with more well-qualified applicants than can be accepted. However, to actively recruit minority graduate students, the Diversity Project at BU will be utilized (see below). *Research Experiences for Undergraduates (REUs):* (see below under 'Engaging Under-represented Groups'). *U.S. Peace Corps Volunteers (PCVs):* The Philippine U.S. Peace Corps admits around 20 new PCVs per year in its Coastal Resource Management (CRM) program. There is strong interest (see support letter) to engage many of these PCVs in this PIRE project and the CRM program director (Javillonar) will actively recruit amongst current and incoming PCVs for involvement in field, laboratory, and workshop phases of this project.

**Engaging Under-represented Groups.** Minority groups are especially under-represented in marine and natural sciences. To enhance the participation of under-represented minority groups at undergraduate, graduate, and postdoctoral level, an aggressive outreach and recruitment effort has been implemented. As part of Barber's CAREER award, partnerships have been developed with the BU Summer Undergraduate Research Fellowship program (SURF), the Woods Hole Oceanographic Institution (WHOI) Summer Student/Minority Fellowship Programs, Minorities in Marine Science Undergraduate Program (MIMSUP), Minorities at Sea Together (MAST), and the Timbuktu Academy to reach under-represented students to reach a broad applicant pool. A web site (<http://people.bu.edu/pbarber/Intro.htm>) has been developed with project description, photos, alumni profiles, and online application. Response to these recruitment efforts has been strong and has grown consistently from 22 applicants in 2005, 33 in 2006 and 42 in 2007. Of these, 77% are women and 77% are from under-represented minority groups with an average GPA of 3.3-3.4. Recruitment has been so successful that The Diversity Project has placed highly qualified undergraduate students in REU programs of other BU faculty and also funnels interested students to other REU programs nationwide through distributing email lists of applicants to other REU program directors. Expanding this program to include 4 students per year (20 over 5 years) will allow this program to provide an exceptional experience to more highly deserving undergraduate students. The recruiting mechanism of The Diversity Project will be formally extended to graduate and post-doctoral recruitment, particularly through ongoing mentoring activities by Barber in minorities programs in the American Association of Limnology & Oceanography and the Society for the Study of Evolution.

**Use of Information and Communication Technologies.** In developing countries creative use of simple technologies is more appropriate than advanced technologies. To maintain communication among project participants, we will employ Internet web cams. Web cams are inexpensive and teleconferencing multiple sites via programs such as Skype™ makes this form of communication readily available and very cost-effective. Weekly virtual laboratory meetings will be teleconferenced via the Internet when PIs are not in country. Regular mentoring and problem solving will be taken care of daily as needed through Internet conferencing with PIs. Monthly updates of progress across all U.S. and IMPA institutions will be maintained through Internet conferencing and email postings. A dedicated web site will also be maintained at ODU to facilitate communication across all collaborating institutions and disseminate

information about the project (e.g. <http://sci.odu.edu/gmsa/>).

**Assessment Strategy and Procedures.** Our evaluation plan will enable the continuous improvement of the project, provide specific outcome measures, and provide data of use to NSF in designing further collaborative projects. It will answer the following questions: 1. Has an international, multidisciplinary, collaborative project been implemented? 2. What are its strengths, weaknesses, enablers and barriers to project success? 3. Do the shared experiences in field and laboratory work and team taught courses enable both the US and international participants to reach a common vocabulary and basic understanding of the research questions and methods? 4. What are the project's specific outcomes in terms of strengthening the participating institutions ability in international collaboration as measured by students trained, courses developed, meeting presentations, and refereed papers?

Assessment will occur through four key steps. **A1.** At the project start, the PIs, including the international partners, will develop a logic/concept map describing their vision of how the project activities fit together to answer the research questions. Activities proposed for each partner will overlay this map. Comparing all of the partners' work and research findings to this map will allow determination of whether international, multidisciplinary collaboration is occurring. **A2.** A quarterly survey of key participants, again, including international senior research staff, Post-docs and students, will to ask how the project is working and what was accomplished during the period and identify enablers and barriers to the project's success. PIs will maintain a guided log that will develop understanding of how such an international, multidisciplinary collaboration is built. The project website will be used to track communication between the international participants, the frequency of communication and the social/research networks that develop amongst the participants. **A3.** A series of pre-/post-tests for the shared experiences in field and laboratory work and team-taught short courses will determine whether project participants develop a common vocabulary and conceptual understanding across the included disciplines. The tests will consist of terms and concepts drawn from seminal papers and other required readings. Students will identify unfamiliar or not understood terms and concepts before and after the course. To calibrate the validity of the results, select samples of the respondents will be asked to provide more in-depth answers. The pre-test will guide in structuring the courses and the post-tests will help determine whether the courses are able to bring a diverse group to a common baseline in an international collaborative setting. **A4.** We will quantify specific outcomes of the project, such as courses taught, students involved, and papers presented or published in refereed journals. We are particularly interested in new courses developed, increased number of students in the disciplines, and the volume of papers (with particular note on those developed through international collaboration) presented and published.

We will use the project website to collect our data including pre/post tests, surveys and PI logs. The website will also permit ongoing communication with graduates/participants of the program to follow the early trajectory of their careers. All project participants will be requested to post yearly updates of their Curriculum Vitae's on the website for at least five years after the end of the PIRE project. The PI will be responsible for yearly reminders and will compile the CV's to determine the extent to which project participant's research and career paths have included international collaboration. This information will be made available annually to NSF's International Programs along with a plot of paper/year focused on research within the IMPA to determine whether PIRE activities have increased research in this region.

The totality of the data from the logic/concept map activity, the surveys and logs of U.S. and international participants, and the analysis of the composition of the research/social networks formed will allow us to examine the impact of the project's international dimension on its participants and whether the projects impact the "strengthening U. S. institutions as vital hubs for international collaboration and training."

**Institutional Commitment to Project and International Collaboration.** Letters of support are on file from all participating institutions (although only 10 can be shown). These greatly extend the scope of research and scientific networks, building on existing individual relationships and professional collaborations between U.S. and IMPA scientists. Additional details of institutional commitments are included in Part 4.

#### 4. International Coordination and Logistics

##### **Preparations for International Residence Visits and Practical Aspects of Life Abroad**

*Plans for Extended Residence in IMPA Countries and International Compatibility Screening:* All ODU and BU Post-docs and full time graduate students will live in the host countries for a period of 12 months during the first four years (Table 2) with one home leave after the first year. These long-term residence scholars will hold appointments of a maximum of 2.5 years and therefore will be replaced mid-project. Cooperating host country institutions are committed to helping with all logistical considerations such as lodging and transportation in the host countries. Long-term low cost visiting faculty and student housing is available near all Universities in the IMPA where US Participants will reside. Initial Post-docs and Senior Graduate students have been selected based on research expertise and previous extended international research experience. Future Post-docs will be selected based on international experience and Junior Graduate students will be prepared for extended residence through short-term (2-month) apprenticeships. All U.S. PIRE research and education participants in this proposal will travel abroad and will be screened during recruitment (see above under 'Strategies for Recruitment') for compatibility with international travel. This will include expected adaptability to different cultures and availability for extended residence abroad when applicable. Applicants at Post-doc, graduate student and REU levels will be queried about international travel experience and referees will be specifically asked about the emotional stability and adaptability of potential applicants.

*Culture and Language Training:* The Philippines was chosen as the first country of extended residence for US PIRE participants because of the widespread use of English (host universities teach their classes in English) and widespread acceptance of U.S. citizens. This will allow rapid start-up of research and education activities in year one. However, success in forging long-term international research and education collaborative ties hinges on cultural fluency. To ensure this, all PIRE participants will undergo culture and language training prior to departure. The ODU Filipino American Center will conduct dedicated courses for PIRE participants coordinated through ODU's Teletechnet conference center for BU and Duke participants. The ODU PI (Carpenter) has over 30 years experience conducting research in the Philippines, including five years of in-country residence research, is fluent in Tagalog (Philippine national language), and will conduct Philippine research culture training sessions for all PIRE participants. Likewise, the BU co-PI (Barber) has over eight years research experience in Indonesia, is knowledgeable in Bahasa (the language widely spoken in both Malaysia and Indonesia) and will conduct sessions on how to be culturally successful while doing research in that country. Bahasa (Indonesian and Malaysian national language) training will also be conducted for PIRE participants through commercial language institutes. We will rely on Dr Ablan (De La Salle University, Philippines) for training on culturally sensitive success in research in Malaysia. Prior to her recent move to the Philippines, she worked closely with Malaysian scientists for over eight years at the World Fish Center in Penang, Malaysia. She also coordinated population genetic research on marine species across Malaysia, Indonesia, and the Philippines as part of her work at the World Fish Center. English is widely spoken in both Malaysia and the Philippines and all Senior International Project Personnel are fluent in English. A host country participant fluent in English will accompany all fieldwork activities to help with interactions with residents in these areas.

*Health Concerns:* All project personnel will be required to have appropriate health and repatriation insurance before traveling overseas. All project personnel will be required to comply with Centers for Disease Control health recommendations for the IMPA, including immunizations. All personnel will attend pre-trip briefings taught by BU and ODU International Programs that will include recommendations for staying healthy and will be required to take CPR and first aid courses. All project participants that will be SCUBA diving will be required to meet the requirements of their respective University rules and regulations before being allowed to dive, including AAUS certification. All diving will require PI and Dive Safety Officer approval of dive plans than include action plans for evacuation and treatment in the event of hyperbaric or other medical emergency.

*Travel Requirements:* PI's will ensure that project participants have the appropriate visas (required for Indonesia, stays of over 3 weeks in the Philippines, and stays of over 90 days in Malaysia) and health clearances, will register all participants with the State Department, and will disseminate information to project participants of any travel warnings or tips posted by the State Department Bureau of Consular Affairs. The PI's will also be responsible for registering their activities with the appropriate U.S. Embassy personnel (Science and Technical Office) in each of the respective IMPA countries.

*Security concerns:* The PI's are aware of the specific limited areas within the IMPA considered generally at-risk for Americans. The only sites considered important for field work that are located within areas considered at-risk for Americans are in southern Mindanao. These four sites are essential for completing tests of hypotheses (Figure 1a: 4-7) and will be sampled only by Filipino participants as part of ongoing UPMSI and NFRDI research activities in these areas. No American participants will be allowed to enter areas of the IMPA considered by U.S. State Department recommendations to be off-limits to Americans. Furthermore, State Department Bureau of Consular Affairs will be consulted prior to departure for any travel tips or warnings and these will be heeded. Project participants will also register with the U.S. Embassy in country and will provide contact information in case a security concern arises while participants are in country. ODU and BU PI's have extensive experience traveling in the IMPA countries and are aware of potential security concerns. The safety of project participants will take priority in all decisions regarding research and education activities.

*Administrative Requirements for Wildlife Collections:* P.I.'s and IMPA senior personnel will obtain requisite collection permits and ensure compliance with all host country laws (e.g. Philippine Republic Act No. 9147, Department of Environment and Natural Resources Administrative Order No. 01) and regulations regarding genetic research. In addition, oversight of marine resources has been devolved to municipalities and Prior Informed Consent agreements are needed prior to completion of marine research in any area of the Philippines. The host country institutions have experience with local legislation and have agreed to ensure that these regulations are met prior to any fieldwork. Both PI's have recent experience procuring these permits (Barber has current permits) and host country institutions have agreed to facilitate these formalities. The ODU PI organized, coordinated with the Philippine Bureau of Fisheries and Aquatic Resources for permits, and participated in joint fish collecting expeditions to the Philippines in 2001 and 2003 for the Smithsonian Institution and Field Museum of Chicago and had no troubles arranging for appropriate permits and Letters of Agreement. Although most work will occur within IMPA countries, export permits for tissues will also be obtained when required.

### **U.S. Institutions' International Commitment to Collaboration, Resources and Experience.**

All three U.S. institutions have long-term commitments to international programs and to the described PIRE activities. As the lead university, ODU has a remarkable track record for stimulating international education and research. "A Portal to New Worlds" is both the university motto and a commitment to bringing international issues and the world's many cultural traditions to ODU students on a daily basis. BU is particularly dedicated to international education. BU International Programs is considered a premier provider of study abroad opportunities. Duke is also committed to internationalization and has a number of global education and research initiatives. These resources will be drawn upon for logistical issues associated with placing students overseas.

The PI's on this project have extensive experience in international research and education. The lead-PI (Carpenter, ODU) has 15 years of experience living and conducting research overseas, including extended research residence in the Philippines, Thailand, Saudi Arabia, Kuwait, and Italy. His most extensive overseas research experience is in the Philippines. A primary motivation for proposing this PIRE project is to pass on his experience and contacts to the next generation of potential international collaborators and forge new collaborative ties with Malaysian and Indonesian scientists. Barber (BU PI) has over 8 years of experience conducting population genetic research of marine organisms in Indonesia and as forged strong ties there with both individual scientists and institutions. Barber is presently hosting an Indonesian graduate student and faculty member (Hamid Toha, Project Participant) in his lab at Boston University. He has also collaborated extensively with Dr. Ambariyanto and numerous undergraduates from