

**Project: GISEC2, Geographic Information Systems for Environment and Community**

**GRANT: NVF – PIT UN – Miami Dade College – 20190145**

**Awarded Institution: Miami Dade College**

**Period:** January 01, 2021 to December 31, 2021

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**Signatory Contact:** Malou Harrison, Ph.D. – Executive Vice President and Provost

**Grant approved amount:** \$90,000

**1. Project summary:**

To continue expanding an academic pathway and project in Geographic Information Systems (GIS) within an Information Technology (IT) framework that includes environmental hazards and disasters risk reduction and public interest orientation.

In GISEC 2 (PITUN 2, period 2021), we have expanded the College Credit Certificate in GIS Technology by adding a high school Dual Enrollment articulation. This CCC is a stackable component of an Associate in Sciences Degree in Computer Information Technology (AS in CIT). Students can also continue their studies at Miami Dade College to obtain a Bachelor of Sciences in Computer Information Technology at Miami Dade College. In phase 2, we have also continued the faculty development process. In addition, we have succeeded in continuing and expanding the platform for project learning and research for environmental hazard modeling and awareness that supports institutional building.

One of the most significant achievements of GISEC2 has been the increment of the cooperation with the local governments, Offices of Resilience of Miami Dade County, and the cities of Miami and Miami Beach, and with the University of Miami and Miami International University. In addition, we have maintained a cooperation relationship with Miami Dade Public Schools, with regular meetings with faculty and teachers, to facilitate the dual enrollment process. In 2021, we have also increased cooperation with other PITUN members: CUNY -College of Staten Island, and University of Michigan, Institute of Transportation. (More details are included in this document). We have also incremented the risk assessment of vulnerable areas of Miami Dade.

**2. Progress towards objectives:**

The project's main goal is to expand a career pathway and institutional capacities of GIS public interest technology applications with emphasis on environmental hazards awareness and community engagement in Miami-Dade County (a minority-majority area significantly impacted by natural hazards and disasters).

In that direction, the main achievements of the project related to the specific objectives in 2021 are:

- To strengthen faculty capacities in GIS: Seminars and GIS projects have been carried out, allowing the coordination of the GIS courses in Miami Dade College and aligning with GIS courses taught at iTech Magnet High School. This effort contributes to the dual enrollment articulation. Project analysis and GIS teaching experiences have also been shared with a postdoctoral student at Florida International University, a GIS expert, who can teach the most advanced GIS courses as part of the College Credit Certificate. This adds to the previous involvement of a Carnegie Mellon post graduate public policies and GIS expert, who has acted as consultant and can also teach basic and advanced courses in GIS.
- The pathway development includes the possibility for students to complete the Bachelor of Sciences in Computer Information Technology and apply to continue Graduate courses in GIS at the Florida International University.
- The project learning and research platform has achieved considerable advancement. Modeling and risk analysis include remote sensing, data capture, photogrammetry, urban and vulnerability modeling, hazards definition, risk analysis, and economic and social losses estimation. This year, we have been able to include the hazards produced by hurricanes, storm surge, sea-level rise, and flooding for the city of Miami. The studies also include the data capture of the King Tide and its effects in vulnerable areas of Miami Dade, including Miami Beach; King Tide remote sensing data capturing, has been completed for a second year in a row; if a sequence can be completed for several years, the impacts of climate change can be outlined.
- This comprehensive risk analysis methodology has been applied to a vulnerable target area of Miami Dade County and will continue to be applied to other sites.
- Partnerships with PIT-UN members have increased. Cooperation with the FIU has continued as members of the Metrolab Network to strengthen resilience in Miami Dade County. Exchanges with CUNY-College of Staten Island and the University of Michigan have been established. The cooperation for the Resilient305 strategy includes the offices of resilience of Miami Dade County and the cities of Miami and Miami Beach.

### 3. **Challenges or lessons learned:**

The main difficulty has been registering students in the program. The main feeder of this program is an IT and GIS program taught at iTech Magnet High School. Unfortunately, due to Covid-19, several students of those deprived areas could not continue their studies, and enrollment went down; some students did not have the conditions to continue online studies without direct and in-person support. The consequence was that we could not launch the courses during 2021 because we did not have enough students to enroll. We have taken actions: to increment contacts and cooperation with MDCPS (Miami Dade Public Schools System) to increase the number of High Schools that can teach GIS in their programs; this also includes incrementing direct contacts with high school teachers to motivate them to learn and teach GIS. In that

direction, we will launch a second free online course in GIS (16 weeks) from February to June 2022. This obstacle continues to be our main difficulty for a successful program. We have maintained a close cooperation with the GIS teacher at iTech High School. The number of students entering the GIS program at the iTech High School during the 2021-2022 year has increased, and some of them are potential candidates for the Academic Pathway at Miami Dade College. We estimate they can join the program in 2022.

#### **4. Equity, diversity, and inclusion:**

While Miami-Dade's population is comprised of 68.6% Hispanics, 18.2% Black Americans, and 51.4% females, there is a significant minority underrepresentation in GIS occupations. Hispanics occupy only 23.8% of GIS positions in the US, while Black Americans 7%, and females 22.2% (EMSI 2019). GIS careers require degrees/certifications. 85.9% of employees in GIS jobs have a college degree (EMSI, 2019); however, there is a lack of GIS study programs and a distinct academic pathway from high school-to-college-to-grad school for GIS in South Florida.

Miami Dade College is #1 in enrollment of Hispanic undergraduate students; #3 in Black non-Hispanic undergraduate students; and #1 in associate degrees awarded to Hispanics and African Americans, making it uniquely poised to meet the project's goal of increasing minority representation in GIS occupations.

Diversity, equity, and inclusion are woven into the fabric of the Miami Dade College. In fact, when MDC opened in 1960, the student body of 1,428 students included the seven black students who made Dade County Junior, as MDC was called then, the first integrated junior college in Florida. Fast forward sixty years, MDC serves some 100,000 students per year, enrolls more Hispanic undergraduate students than any other college or university in the country, and is the third largest to enroll Black non-Hispanic undergraduate students. The College is number one in the nation in Associates degrees awarded to Hispanics and African Americans. In 2016, the College received the Higher Education Excellence in Diversity (HEED) Award from INSIGHT Into Diversity magazine. The HEED is the only national recognition honoring colleges and universities that exhibit outstanding efforts and success in diversity and inclusion throughout their campuses. MDC embraces its mission as democracy's college, Miami Dade College changes lives through accessible, high-quality teaching and learning experiences. The College embraces its responsibility to serve as an economic, cultural, and civic leader for the advancement of our diverse global community.

This project creates the opportunity to enroll students from the diverse community of Miami-Dade County, creating pathways for currently underrepresented groups to enter the IT sector, and in particular, GIS. Minorities (primarily Hispanics and African Americans) will be able to participate in an academic pathway that is linked from high school, to college CCC and AS degree, and to BS and graduate certificates in GIS. Given the project's reach into a community that is more than two-thirds (68.6%) Hispanic and where nearly one-in-five persons (18.2%) are African-American the potential impact is significant.

Creating this academic pathway in GIS at Miami Dade College opens opportunities for minorities to access this growing job demand. Making the career and graduating students requires a certain time; in that direction, the establishment of the courses, the faculty development, and the first and second phases of data and research activities, already completed at this level, define the foundations of this program. Also, most of the faculty involved in the program are minorities. In addition, the project will continue supporting the professional development of minority faculty and minority students enrolled in GIS programs.

Besides, hurricanes can occur annually, and millions of South Florida residents feel impacts of sea-level rise; sea-level rise is already affecting the coastal areas of Miami Dade, with severe economic and social consequences. Despite this, there's insufficient public and community awareness of disaster risk approaches. In addition, this project develops capacities for risk analysis and student and community awareness to pursue environmental justice. In addition, GISEC2 contributes to assessing environmental risk in vulnerable areas, raising awareness of the political, ethical, and societal urgency that climate change, disasters, and resilience building require.

#### **5. Network impact:**

The academic program developed is available for any PITUN or Non-PITUN academic institution.

The project has supported increasing cooperation with Metrolab members: the offices of resilience of Miami Dade, The City of Miami and the City of Miami Beach, Florida International University, The University of Miami, and Miami Dade College. Our contribution supports several aspects of the Resilient305 strategy ([resilient305.com](http://resilient305.com)), including risk assessment and awareness, community engagement, emergency readiness. As part of the cooperation, an article was published in the Journal of Extreme events (see attachments).

We maintain increasing cooperation with FIU (PITUN member). As part of this effort, we continuously analyze cooperation avenues in environmental issues; one of them has been searching for a solution for the water supply system's water leaking problem in Miami Dade County, using remote sensing. We also maintain continuous cooperation with the Center for Diversity and Student Success in the College of Engineering and Computing at FIU.

As part of the project, we have cooperated with PITUN members and grantees. One of them is with Prof. Katie Cominsky (Dean's Fellow, Humanities and Social Sciences Academic Coordinator, CUNY, College of Staten Island-St. George), with whom we are planning an activity related to the vulnerability of Staten Island communities, for the 10th anniversary of hurricane Sandy (October 2022). We have also cooperated with Tayo Fabusuyi, Research faculty of the University of Michigan, Transportation Research Institute, on entrepreneurship of black populations.

Other positive outcome of this effort has been the invitation that we have received to be part of the project: Large-scale CoPe: Integrated Engineering, Environmental, and Socioeconomic Approaches for Coastal Living with Aging Infrastructure in Times of Climate Change (iEESA), led by Florida International University, and includes the participation of the University of Miami, University of Washington, The Office of Resilience of Miami Dade, Frost Museum and Miami Dade College. The organization of the group and the guidelines of the cooperation begun in November 2021.

#### **6. Institutionalization of Public Interest Technology:**

Miami Dade College has several initiatives associated with Public Interest Technology. The GISEC project has the direct support of the Dean of EnTec (Engineering and Technology) Manuel Perez, and the Vice President of Innovation and Technology Partnerships, Antonio Delgado. Besides, ENTEC-MDC has also developed projects on Ethics and Technology with faculty and students.

## 7. Attachments:

### Publications:

Article presented at the Symposium on Coastal Resilience, University of Miami, April 2021:

#### **Local Disaster Risk Assessment and Community Engagement to improve Resilience**

Authors: Genatios, Carlos (1), Lopez, Oscar A. (2); Nunez, Alexander (3); Coronel, Gustavo (2); Garcia Reinaldo (4); Lamar, Simon (2); King, Robert (5) Lafuente, Marianela (2)

1 Miami Dade College

2 Consultants for the GISEC project

3 Digital E Consulting LLC, Consultant for GISEC Project

4 Florida International University

5 Itech Magnet High School

<https://drive.google.com/file/d/14vkS6i8O4qXakwmTRRBFcUxZ72Q98xtR/view?usp=sharing>

Article published in the Journal of Extreme events:

#### **A System for Resilience Learning: Developing a community-driven, multi-sector research approach for greater preparedness and resilience to long-term climate stresses and extreme events in the Miami metropolitan region**

Authors: Troxler, TG(1), AC Clement(2), Y Arditi-Rocha(3), G Beesing(4), M Bhat(1), J Bolson(1), C Caban-Aleman(1), K Castillo(5), M Cruz(4), A Dodd(6), SD Evans(2), AL Fleming(2), C Genatios(7), J Gilbert(8), A Hernandez(1), C Holder(1), M Ilcheva(1), E Kelly(9), J Lombard(2), KJ Mach(2), JF Murley(4), A Knowles(10), J Obeysekera(1), J Posner(2), A Sarwat(1), R Silverstein(9), JA Stuart(1), M Sukop(1), S Wdowski(1), and E Wheaton(1)0

- (1) Florida International University, (2) University of Miami, (3) The CLEO Institute, (4) Catalyst Miami, (5) Miami-Dade County Office of Resilience, (6) City of Miami Office of Resilience and Public Works, (7) Miami Dade College, (8) High Impact Integrated Solutions, (9) City of Miami Beach Environment and Sustainability Department, (10) Miami Waterkeeper

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